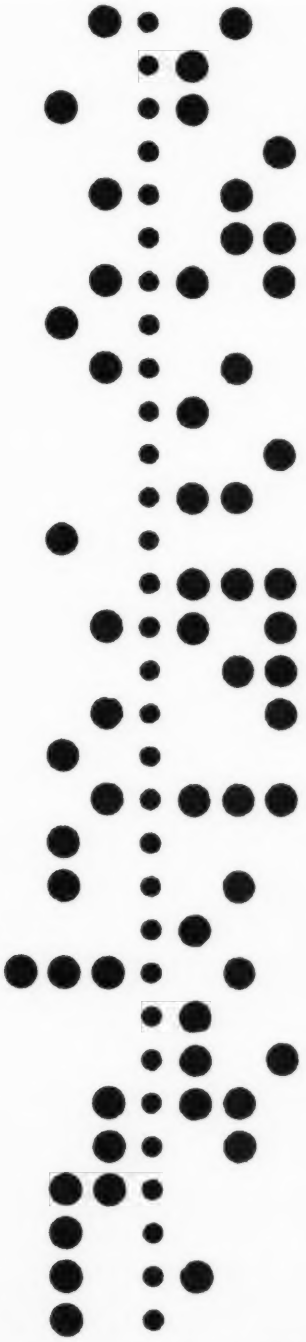
August 5, 1965

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



A Semi-monthly Abstract Journal for Science and Industry

CLEARINGHOUSE
FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION

U. S. DEPARTMENT OF COMMERCE / NATIONAL BUREAU OF STANDARDS / INSTITUTE FOR APPLIED TECHNOLOGY

August 5, 1965 / Volume 40, Number 15

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

Issued twice a month by the Clearinghouse for Federal Scientific and Technical Information. Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402. Address changes should be sent to Superintendent of Documents.

PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability of new reports of U.S. Government-sponsored R&D released by the Department of Defense and other Federal agencies. Included are reports from the Atomic Energy Commission and the National Aeronautics and Space Administration, which issue separate announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by accession/report number under 22 major subject category headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes. Reports of current high industrial interest are featured in "Research Highlights."

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting accession/report numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject category headings; the various indexes will aid in locating those reports. A single reference guide to new Government-sponsored technical literature, *Government-Wide Index to Federal Research and Development Reports*, is compiled monthly by the Clearinghouse from the combined indexes of this journal, *Nuclear Science Abstracts* (AEC), *Scientific and Technical Aerospace Reports* (NASA), and *Technical Abstract Bulletin* (DDC). This combined index is available from Superintendent of Documents, U.S. Government Printing Office, annual subscription $10, ($2.50 for foreign mailing) or $1.25 single copy.

TO ORDER REPORTS

All reports announced herein are available to the general public from the Clearinghouse, or in some cases from other sources as noted. To order Clearinghouse reports, use accession/report number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Clearinghouse deposit accounts. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. They are abstracted in the following journals available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $33.00 a year domestic, $42.00 foreign, $2.50 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated.
Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

RESEARCH highlights

Reports of current high industrial interest

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Bonding/Joining

CONTROLLED INDUCTION SOLDERING OF ELECTRICAL CONNECTORS

(Order SC-DR-65-74 Automatic Induction Soldering, HC $1.00/MF 50 cents.)

An induction soldering process which is controlled by an infrared radiometer has been developed for the AEC by Sandia Corp. The process can be used for soldering electrical connectors to cable assemblies. Solder joints form a hermetic seal, and excessive heat is avoided, thus preventing damage to temperature-sensitive parts placed in connectors. The equipment used by the researchers consisted of a 20-kw induction power supply, an infrared radiometer, an oscilloscope, a recording oscillograph, a strip-chart recorder, and a sensitive control relay. The induction unit operated at 500 kc, and the power level was controlled by varying the bias voltage of three control thyratrons. Researchers found the most efficient heating of a circular joint is accomplished with a flat concentrating type of heating coil placed close to and in the plane of the joint. They say a hinged single-turn induction coil should be used to solder joints at necked-down sections of a cable assembly. Combinations of magnetic and nonmagnetic material at joints require much more precise positioning than joints between materials of similar magnetic properties and should be avoided if possible. Joints should be designed to minimize differential expansion during heating and to provide a visible solder fillet.

Communications

COMPILATION OF ANALOG-TO-DIGITAL ENCODERS

(Order AD-613 521 Technical Analysis of Brush and Brushless Type Shaft Position Analog-to-Digital Encoders, HC $4.00/MF 75 cents.)

Easy access and ready reference to existing brush and brushless shaft position analog-to-digital encoders is now possible via a document prepared by the Navy. The report contains two tables and four indexes providing data on size or diameter, output, manufacturer and catalog number, and mechanical and electrical characteristics. Researchers in the BuWeps Engineering Standardization Office note that a myriad of magnetic, capacitive, and optical types of encoders are available for military and commercial applications. The end result of this activity has been the formation of a huge reservoir of encoding devices, which is so vast that the equipment designer is easily lured into developing a new encoder instead of searching for an existing one. This document enables the designer to quickly determine if a suitable device exists for a given application and thus can prevent needless duplication of effort and expense in developing a new one.

Data Processing

MEDIUM-SPEED RANDOM-ACCESS MEMORY

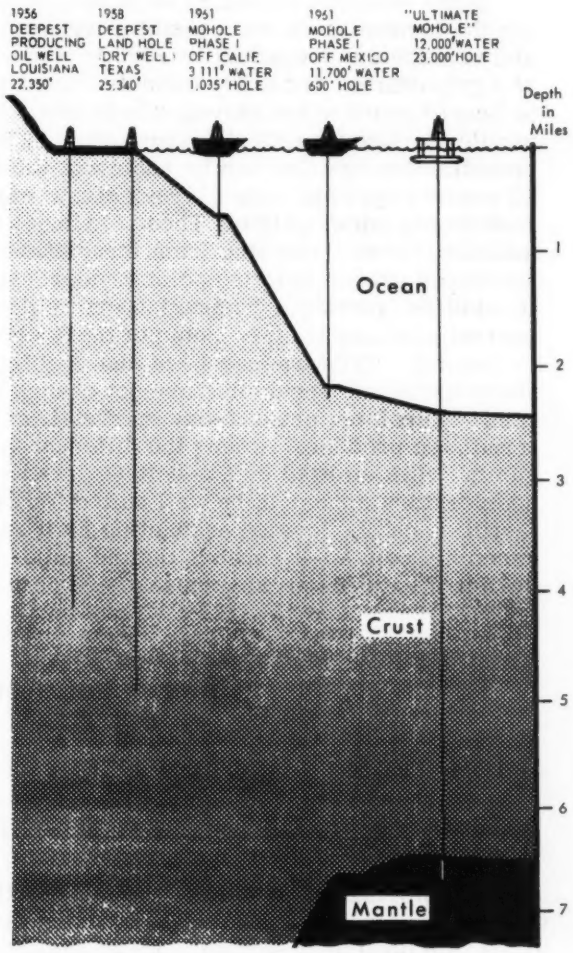
(Order AD-614 831 Study and Investigation of Technique for Constructing Medium-Speed Random Access Mass Memory, HC $6.00/MF $1.25.)

Construction of a medium-speed mass random-access memory is feasible using a batch fabrication technique. This technique makes use of toroids etched out of sheet permalloy to batch fabricate the memory elements, and all drive and sense wiring is provided by a combination of precision etching and plating processes. The resultant memory is inherently low power. Air Force researchers developed system designs which use for the most part integrated circuitry. The resulting mass memory system of 10^8 bits capacity is small, light, economical, low power, medium speed, nonvolatile, and nondestructive in read-out. The major accomplishment of the researchers thus far has been the successful fabrication of planes having 16 x 16 bits on 25 mil centers with reasonable and steadily improving yield. They have also been successful in fabricating 64 x 64 bit planes on 25 mil centers using mechanical pin registration.

PROJECT MOHOLE

(Order PB-167 299 Project Mohole, HC $1.00/MF 50 cents.)

Of all things it is possible to do or think of doing, which one will yield the most information about the planet we live on? This was asked at a 1957 meeting of the National Science Foundation's Advisory Panel for Earth Sciences. And the answer? Explore the interior of the earth by drilling a hole into it from the bottom of the ocean.



Project Mohole--named for the Yugoslav seismologist Mohorovicic who discovered the boundary between the earth's crust and mantle--finally emerged from that 1957 meeting and, after long planning, drilling began in 1961 under National Science Foundation funding and administration. The first holes were dug off La Jolla, Calif., to a depth of 1,035 feet in 3,111 feet of water. Cores of sediments were brought up and scientists examined them to learn more about the history of the earth. Then, beneath 11,700 feet of water, Project Mohole engineers dug holes 600 feet deep off the coast of Mexico at a site 40 miles east of Guadalupe Island. There, for the first time in history, man penetrated the second layer of the earth's crust, showing that at least the top layer at this location is basalt--a hard rock formed by the solidification of lava. Project Mohole then moved into Phase II of its program with a goal of drilling right through the earth's crust and into the mantle. NSF calls this "Ultimate Mohole." From a huge platform at sea in water 12,000 feet deep, engineers plan to send a drill bit to the crust and dig a hole 23,000 feet to the mantle. This 6 1/2 miles of drill pipe will bring up cores that will give scientists a hugh amount of information on the history of the earth. And, accordingly to Science, the weekly journal of the American Association for the Advancement of Science, "Since the seas cover about 71 percent of the earth's surface, the wealth under them could be greater than that now known on land." A publication prepared by the National Science Foundation for a nontechnical audience gives further background information on Mohole's origin, past accomplishments, and future scientific objectives. Project Mohole: A Report Bibliography, available free from the Clearinghouse, lists the reports that have been released thus far.

Food Processing

MANY BENEFITS FROM IRRADIATION OF FRESH FRUITS AND VEGETABLES

(Order TID-21628 Radiation-Pasteurizing Fresh Strawberries and Other Fresh Fruits and Vegetables, HC only, $2.00.)

Many benefits, including increased storage and shelflife and reduced prices for the consumer, are accrued through radiation-pasteurization of fresh fruits and vegetables, according to a study made for the AEC by the U. S. Department of Agriculture. The study indicates that the export market in particular stands to benefit much since storagelife is dramatically increased, allowing food handlers more time to ship their produce to markets. As an example of the potential savings that can be achieved, the USDA researchers say that the 15 percent spoilage rate of fresh strawberries can be cut to 5 percent through radiation-pasteurization. These savings are more than enough to offset the additional costs resulting from irradiation processes, and thus not only means increased profits but also point to decreased market prices for the consumer. In addition, radiation-pasteurization would reduce the need for chemicals to control spoilage losses. Some of these chemicals are suspected to be harmful to humans. USDA researchers also say the physical requirements for handling fresh fruits and vegetables are not changed significantly by radiation-pasteurization. Therefore, present-day market-handling methods would be adequate for irradiated produce. Among the different types of available ionizing radiations, gamma rays emitted by a cobalt-60 irradiator and X-rays emitted by linear accelerators appear to be well suited for food irradiation. The pasteurizing facilities can be located at existing fruit and vegetable packinghouses or assembly points. It appears that no major changes in the basic layout and design of existing packinghouses need be made.

Information Technology

AUTOMATED INFORMATION SYSTEMS

(Order AD-615 718 The Conceptual Foundations of Information Systems, HC $2.00/MF 50 cents.)

The information system of the future will be fully automated, will have user responsiveness, automated indexing, automated classification, and microfilm document storage, and will offer rapid, efficient storage and retrieval of documents and data. So says an information technologist of System Development Corporation in a paper presented at the 1965 Symposium on the Foundations of Access to Knowledge held at Syracuse University. The paper is now available from the Clearinghouse and outlines seven basic concepts and implications concerning need, equipment-user responsiveness, language processing, indexing, classification, and storage. The system design implications of each concept are discussed separately and then organized to form an information storage and retrieval system of the future called BOLD (Bibliographic On-Line Display).

Mechanical Equipment

MANUAL ON VALVE TECHNOLOGY

(Order N65-19851 Advanced Valve Technology, HC $1.50/MF 75 cents.)

New guides for designers, mechanical engineers, and industrial users are contained in a manual on advanced valve technology now available. Prepared by NASA's Technology Utilization Division, the manual covers the state-of-the-art, identifies new advancements made in the space program, and describes the latest technology. "Industrial management is becoming more and more aware of the importance of valves in industrial plants and processes," says the Space Agency. "In the hydrocarbon and natural gas industries, valves represent 8 percent of new capital outlays and 10 percent of maintenance budgets for replacement purchases." Some of the problem areas considered in the NASA manual are choice of materials, reliability, wear, leakage, and weight and size reduction. In many industrial processes requiring accurate mixing, valve leakage can ruin a run or batch, and so the report deals with this problem under seals, packing, and housings.

Plastics

HYDROSTATIC PRESSING OF TEFLON

(Order La-3255-MS Fabrication of Teflon by Hydrostatic Pressing, HC only, $1.00.)

Hydrostatic pressing for making functional parts from Teflon is strongly endorsed by the Los Alamos Scientific Laboratory for cases in which better-known methods are difficult, expensive, or impossible. These are situations involving only a few large parts, when severe changes in section thickness make conventional molds impractical, and when maximum uniform density is desirable for correct function of products. If more than one of the stated situations is present, Los Alamos says the hydrostatic process should be investigated. Tooling cost per unit is comparatively low if the number of parts to be made is small. The process is not very sensitive to variations in control parameters. If the part need not be pressed and sintered to final dimensions but can be machined from an oversized blank, the first piece made will be useable.

Printing, Graphic Arts Photography

COLOR DISPLAYS BASED ON MAGNETOCHEMISTRY

(Order AD-615 504 Color Displays Based on Magnetochemistry, HC $5.00/ MF $1.00.)

A color film responsive to a magnetic field developed by Air Force researchers consists of randomly positioned particles of magnetostrictive material with outer shells of brittle metallic coatings. By applying a small external magnetic field to the film, the magnetostrictive material changes size and shape so that the coatings break and allow chemical reactions which result in colors. Thus the researchers found that the principles upon which a magnetochemical display is based are feasible. Microsecond magnetic pulses will provide an immediate flood of color. The formation of three primary colors leading to additive color reproduction is possible, and a triggering mechanism has been proposed to selectively activate these primary colors. The magnetochemical colors are of sufficient intensity in comparison with the transparent unexposed areas to be clearly discernible and sharply defined upon high-level projection. The new medium is therefore suitable for the presentation of displays.

Quality Control Standards, Specifications

ARMY SYMPOSIUM ON VALUE ENGINEERING

(Order AD-616 516 Value Engineering Symposium, Advancement in the State-of-the-Art, HC $7.45/MF $2.25.)

Proceedings of the Army Missile Command's 1964 value engineering symposium are now available. This was the first conference ever presented by any agency of DOD dealing with the state-of-the-art of this relatively new branch of engineering. Army Missile Command reports "overwhelming success" in its value engineering programs, and conducted the symposium to acquaint DOD personnel, contractors, and others with the new techniques and thinking being employed to insure reduced costs. Various accomplishments along these lines are presented. A paper on quality control and reliability clearly indicates what the value engineer thinks as he analyzes equipment and processes. He asks himself the following questions: "What is it? What is it actually supposed to do? What is its value? What does it cost?" The ensuing analysis usually yields much information about cost cutting possibilities through eliminating useless parts and procedures without sacrificing efficiency. According to the author of the paper, the discipline is now being applied in many industrial firms cutting costs of both civilian consumer products and items for the military. DOD contracts often contain the requirement that value engineering or value analysis be a part of the program for design, development, and fabrication of military products. (This document cited in this issue on page 115.)

Selection Aids For Industry

▶ GOVERNMENT-WIDE INDEX appearing monthly is a single reference guide to Government-sponsored research and development announced in four of the major technical announcement journals of the Federal Government: USGRDR, Technical Abstract Bulletin of the Defense Documentation Center, Nuclear Science Abstracts of the Atomic Energy Commission, and Scientific and Technical Aerospace Reports of the National Aeronautics and Space Administration. (Annual Subscription $10, $2.50 additional for foreign mailing, $1.25 single copy.) Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402.

▶ SELECTIVE BIBLIOGRAPHIES--from Abrasives to Zirconium--will be mailed free. A list of more than 200 available from the Clearinghouse will be mailed on request. Here is a sample list of ten:

SB-441 Materials Testing
SB-444 Electronic Miniaturization
SB-480 Textile Fibers
SB-515 Paper
SB-518 Paints and Varnishes
SB-523 Batteries
SB-524 Expanded Plastics
SB-526 Metal Composites
SB-529 Hydrofoil Boats
SB-541 Fluid Amplifiers

▶ LITERATURE SEARCHING SERVICE provides two kinds of bibliographies:

a) Current Awareness on selected fields of interest on a periodic basis.
b) Retrospective, listing the literature available to date.

These searches are made to order using the combined facilities of the Clearinghouse, the Science and Technology Division of the Library of Congress and the science collections of the Departments of the Interior and Agriculture, or any combination of these facilities at $11 an hour (8 hours minimum searching time).

▶ FAST ANNOUNCEMENT SERVICE reviews reports of special industrial significance. Announcements are classified and mailed by industrial category. No charge.

▶ RESEARCH REVIEWS available free are packaged summaries, abstracts and bibliographies gathered under the following titles (other titles are in progress):

OTR-101 Hot Machining
OTR-102 Nickel-Titanium Alloys
OTR-103 Photochromism and Phototropism
OTR-104 Fire Extinguishing Material Technology
OTR-105 Flame-Retardant Textiles
OTR-106 Humidity Controlled Warehousing
OTR-107 Concrete Technology
OTR-108 Volatile Corrosion Inhibitors
OTR-109 Grease Lubrication
OTR-110 Thermoelectric Materials and Fabrication
OTR-111 Integrated Circuitry
OTR-112 Fluid Amplification
OTR-113 Ultrasonic Welding
OTR-114 Ultrasonic Testing
OTR-115 High Energy Metal Forming
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OTR-117 Dielectric Films in Microelectronics
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Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities. See also related fields: 16 Missile Technology, 17 Navigation, Communications, Detection, and Countermeasures, 20 Physics, and 22 Space Technology..... 1, S-1

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Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry. See also related field: 06 Biological and Medical Sciences..... 6, S-2

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04 ATMOSPHERIC SCIENCES

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06 BIOLOGICAL AND MEDICAL SCIENCES

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects. See also related fields: 02 Agriculture, 05 Behavioral and Social Sciences, and 07 Chemistry..... 38, S-5

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Includes biological oceanography; cartography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism. See also related field: 04 Atmospheric Sciences..... 69, S-7

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19 ORDNANCE

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance. See also related field: 18 Nuclear Science and Technology..... 134, S-33

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Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation. See also related fields: 03 Astronomy and Astrophysics, 07 Chemistry, 09 Electronics and Electrical Engineering, 10 Energy Conversion (Non-propulsive), 11 Materials, 13 Mechanical, Industrial, Civil, and Marine Engineering, and 17 Navigation, Communications, Detection, and Countermeasures..... 136, S-34

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TECHNICAL ABSTRACT BULLETIN

01. Aeronautics

AD-616 507 Div. 1/2, 9/6
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
EMPIRICAL RELATIONSHIPS FOR JET-FLAP LIFT AND DRAG PREDICTION,
by D. J. Blakeslee. 21 Jan 60, 15p
Rept. no. P-1889
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Jet flaps, Fluid dynamic properties), (*Lift, Mathematical prediction), (*Drag, Mathematical prediction), Wings, Design.

Empirical relations for the prediction of the lift and drag of unswept three-dimensional jet-flapped wings are shown, along with the necessary inputs. Plotted data show that the equations organize lift and drag data with a consistency sufficient for preliminary design use. (Author)

AD-616 519 Div. 1/5, 1/11, 22/4, 30/2
CFSTI Prices: HC$3.00 MF$0.75

Naval Weapons Labs., Dahlgran, Va.
A STRETCH COMPUTER PROGRAM FOR DETERMINING WEAPON FRAGMENTATION HAZARDS TO LAUNCHING AIRCRAFT,
by Rosemary Kline and James R. Newman.
May 65, 95p Technical memo. no. K-56/65
Task RMM042007 2101F00809001
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Programming(Computers), Fragmentation), (*Weapons, Fragmentation), (*Aircraft, Hazards), Probability, Tactical weapons.

A detailed description, including flow diagrams, is given for a computer program used to determine the probability of an aircraft being hit by a lethal fragment from detonating weapons which it has released. (Author)

AD-616 570 Div. 9/6
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE VERTICAL MOTION OF SOLID SPHERES IN THE ATMOSPHERE,
by R. R. Rapp. 18 Feb 60, 23p
Rept. no. P-1921
Unclassified report

To be submitted for publication in the Journal of Meteorology.

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Falling bodies, Atmosphere), (*Motion, Spheres), Aerodynamic characteristics, Velocity, Dynamics.

An equation of motion is determined for spherical objects falling through the atmosphere. A method for computing terminal velocities over a wide range of elevation and particle size is then developed. The manner in which a class of spheres, which satisfy a density size relationship, approach terminal velocity from rest is investigated. Finally the effect of oscillatory motions on very small spheres is discussed. (Author)

AD-616 615 Div. 9/6
CFSTI Prices: HC$4.00 MF$1.00

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
FREE-MOLECULE FLOW THROUGH AXI-SYMMETRIC TUBES,
by S. J. Townsend. Mar 65, 124p
Rept. no. UTIAS-106
Grant AF AFOSR276 64 Unclassified report
AFOSR 65-0749

Descriptors: (*Gas flow, Transport properties), Molecules, Momentum, Energy, Differential geometry, Boundary value problems.

The properties of the flow field of a gas passing through an internally reflecting, axi-symmetric tube have been calculated. The major assumptions are (1) that the mean free path of molecules in the external gas is large compared with the tube dimensions, (2) that molecules incident on the internal surface undergo complete energy accommodation, (3) that there is no accumulation or ablation at the wall and (4) that the boundary distribution functions for the gases are Maxwellian. Expressions for convection of mass, axial momentum and kinetic energy through the tube are derived. Radial distributions of these flow quantities across the inlet and exit planes are treated. Integrations over the inlet and exit planes give the total quantities convected through the tube. The density and pressure fields within the tube have been derived. All the flow parameters mentioned have taken into consideration both the geometry and the temperature of the tube wall. There are no restrictions on geometry except that no portion of the wall may shield any other portion. Line of sight trajectories prevail. Temperature profiles have been imposed along the wall in the form of boundary constraints. As a specific application, the density at the center of a hemispherical reflector has been derived for arbitrary speed ratios of the flow into the hemisphere. A representative sampling of numerical results is included. Mass flow calculations are in agreement with those of other investigators. Results show that it is possible to develop a net thrust on an internal flow system under free-molecule flow conditions. (Author)

AD-616 617 Div. 9/7, 9/6
CFSTI Prices: HC$3.00 MF$0.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.

THEORETICAL AND EXPERIMENTAL STUDIES OF AIRFOIL CHARACTERISTICS IN NONUNIFORM SHEARED FLOW.
Final rept. for Jun 63-Aug 64,
by W. Gordon Brady. May 65, 92p
Rept. no. CAL-AF-1841-S-1
Contract DA44 177AMC70T, Task 1D121401A142
USAAML TR-65-17

Unclassified report

Descriptors: (*Airfoils, Aerodynamic characteristics), (*Propellers(Aerial), Lift), Wind tunnels, Shear stresses, Gas flow, Separation, Two-dimensional flow, Turbulence, Jets, Angle of attack, Axially symmetric flow.

Work is reported on a continuation of the experimental study of the two-dimensional wing in a three-dimensional sheared flow and also treats the theory of two-dimensional nonuniform sheared flows in an attempt to determine the mechanism responsible for the marked changes in airfoil stall characteristics which were demonstrated experimentally in Reference 3. It was felt desirable to complete the three-dimensional experimental program before resuming experimental work with two-dimensional nonuniform sheared flows. The experimental wing data obtained are presented and compared, where possible, with relevant two-dimensional data and with theory.

AD-616 626 Div. 1/1
CFSTI Prices: HC$5.00 MF$1.25

LTV Vought Aeronautics Div., Ling-Temco-Vought, Inc., Dallas, Tex.
DIRECT LIFT CONTROL AS A LANDING APPROACH AID IN THE F-8C AIRPLANE-SIMULATOR AND FLIGHT TESTS,
by J. D. Etheridge and C. E. Mattlage. 31 Dec 64, 180p Rept. no. 2-53310/4R-175
Contract N62269 2403

Unclassified report

Descriptors: (*Landing aids, Glide path systems), (*Glide path systems, Landing aids), Fighters, Lift, Control systems, Approach, Flight simulators, Flight testing, Pilots, Attitude control systems, Ailerons, Wind tunnels, Statistical analysis.

The direct lift control system varied the droop of the aileron as a flap through a control knob on the stick. This system provided a more rapid means of changing altitude than normal longitudinal control. Direct lift control was found to be superior to normal longitudinal control for maintaining a precise glide path. (Author)

AD-616 647 Div. 9/6
CFSTI Prices: HC$2.00 MF$0.50

Pennsylvania State Univ., University Park. Dept. of Aeronautical Engineering.
THEORETICAL INVESTIGATION OF TURBULENT FLOW OF NON-NEWTONIAN MEDIA.
Annual summary rept. for 1 Sep 64-30 Jun 65,
by John L. Lumley and Kirtan Singh. 10 Jun 65, 36p
Contract Nonr65633

Unclassified report

Descriptors: (*Turbulence, Theory), (*Fluid flow, Turbulence), Boundary value problems, Integral transforms, Tensor analysis, Viscoelasticity, Shear stresses, Molecules.

AD-616 650 Div. 1/1
CFSTI Prices: HC$4.00 MF$0.75

Norden Div., United Aircraft Corp., Norwalk, Conn.
UNIVERSAL CONTACT ANALOG DISPLAY (UCAD) RESEARCH. PHASE I. SYSTEMS ANALYSIS.
Technical progress rept.,
by Peter Williams. 15 Apr 65, 112p
Rept. no. 1161-R-0011
Contact Nonr448900

Unclassified report

Descriptors: (*Flight instruments, Specifications), (*Vertical take-off planes, Flight instruments), (*Television display systems, Flight instruments), Design, Systems engineering, Analog systems, Sonar, Carrier landings, Hovering, Rotary wings.

The results are presented of the Systems Analysis phase of the Universal Contact Analog Display (UCAD) Research Program, initiated in June 1964. The goal of this research is the development of design specifications for a universal raster-scan TV flight instrument suitable for use in fixed-wing, rotary-wing, and VTOL aircraft. Information parameters were identified and quantified by means of a systematic analysis of aircraft performance and flight information requirements. Mission segments, consisting of common flight maneuvers, were defined as a result of mission analyses. Loop diagrams are configured for fixed- and rotary-wing aircraft incorporating linear transfer functions. Aircraft response criteria are developed based on a combination of military handling quality specifications and pilot opinion reports. Display augmentation requirements were specified. Total display information requirements for flight control, propulsion systems, and special mission parameters were established.

AD-616 658 Div. 1/1, 1/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AN APPROXIMATE INVESTIGATION OF THE EFFECT OF BOUNDARY LAYER CONTROL PUMPING ON POWERPLANT PERFORMANCE,
by T. F. Kirkwood. 25 Apr 60, 7p Rept. no. P-1979

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Boundary layer control systems, Pumps), (*Aircraft engines, Boundary layer control systems), Turbojet engines, Turboprop engines, Bleed systems, Drag, Performance(Engineering).

A first-order analysis is described of the effects of boundary layer bleed pumping on the performance of turbojet and turboprop powerplants.

AD-616 670 Div. 9/6

RAND Corp., Santa Monica, Calif.
TENTATIVE GENERALIZATION OF LEADING-EDGE VISCOUS INTERACTION PHENOMENA,
by A. F. Charwat. 15 Mar 60, 21p
Rept. no. P-1994

Unclassified report

Prepared for presentation at the International Symposium on Rarefied Gas Dynamics (2nd), to be held in Berkeley, Calif., 3 Aug 60.
Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Leading edge flaps, Aerodynamic characteristics), (*Aerodynamic characteristics, Leading edge flaps), Viscosity, Superaerodynamics, Hypersonic flow, Pressure.

The pressure induced by the interaction of a viscous boundary layer with an external hypersonic flow on sharp leading-edge surfaces is a function of three independent parameters. These represent the pressure-deflection sensitivity of the external flow field (interaction parameter), the length scale for the establishment of a boundary layer (rarefaction parameter), and the effect of heat transfer on its rate of growth (wall temperature ratio). An isobar map of the interaction problem in the domain of these independent variables is suggested and explored by using the existing data. This representation provides a framework within which to study further leading-edge interaction phenomena and also discloses contradictions and insufficiencies in the currently available data. (Author)

AD-616 713 Div. 9/7
CFSTI Prices: HC$2.00 MF$0.50

Oklahoma Univ., Norman.
THE EFFECT OF SOUND WAVES AND FLEXIBLE BOUNDARIES ON TURBULENCE.
Master's thesis,
by Donald Herbert Fisher. 1965, 46p
Contract AF33 608 1096
Unclassified report

Descriptors: (*Turbulence, Damping), (*Turbulent boundary layer, Sound), (*Sound, Turbulence), (*Airfoils, Drag), (*Boundary layer, Separation), Wake, Wings, Laminar flow, Lift, Anemometers.

Research was conducted on separation of boundary layers on airfoils at high angles of attack, and skin friction drag in laminar and turbulent boundary layers on airfoils at low angles of attack.

AD-616 733 Div. 9/2, 2/7, 22/6
CFSTI Prices: HC$1.00 MF$0.50

American Meteorological Society, Boston, Mass.
SHOCK WAVE PROPAGATION IN A NONHOMOGENEOUS ATMOSPHERE IN THE DIRECTION OF DECREASING DENSITY,
by Yu P. Raizer. Apr 65, 15p Rept. no. T-R-461
Contract AF19 628 3880
TT 65-62507 Unclassified report

Rasprostranenie Udarnoi Volny v Neodnorodnoi Atmosfere v Storonu Umensheniya Plotnosti.
Trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) n4 p49-56 1964.

Descriptors: (*Air burst, Shock waves), (*Shock waves, Propagation), (*Upper atmosphere, Shock waves), Vacuum, Gas flow, Density, Mathematical models, Differential equations, Series, Explosion effects, High altitude, USSR.

The paper includes a solution of the self-modeling problem of the propagation of a plane shock wave in a nonhomogeneous atmosphere whose density varies exponentially (barometrically) in space. The shock wave travels in the direction of decreasing density. There is also a discussion of the self-modeling escape of a gas into a vacuum, which occurs after a shock wave departs into infinity and disappears. The data obtained can be used for an approximate description of an upper flow pattern produced by a violent explosion in a nonhomogeneous atmosphere. (Author)

AD-616 734 Div. 1/3, 1/4
CFSTI Prices: HC$4.00 MF$1.00

Douglas Aircraft Co., Inc., Long Beach, Calif.
Aircraft Div.
A STUDY OF ROUGH-TERRAIN-INDUCED STRUCTURAL LANDING LOADS. PHASE III. SIMULATED LANDINGS OF AN OV-1 AIRCRAFT OVER ROUGH TERRAIN AND COMPARISON OF EXPERIMENTAL LOADS WITH THEORETICAL PREDICTIONS.
May 65, 133p
Contract DA44 177TC735, Task 1P125901A14602
USAAML TR-65-5
Unclassified report

See also AD-430 063.

Descriptors: (*Landing gear, Drop testing), (*Terrain, Aircraft landings), (*Aircraft landings, Loading(Mechanics)), Observation planes, Short take-off planes, Vertical take-off planes, Taxiing, Mathematical analysis, Structures, Correlation techniques, Elasticity, Design, Programming(Computers), Aircraft tires, Theory.

The report describes the third phase of a project directed toward the establishment of aircraft design criteria for rough terrain landing operations. The report presents the results of moving drop tests in which an OV-1 main landing gear was made to traverse simulated terrain irregularities of various sizes and shapes during landing impact. Test results for several cases are compared with the results of dynamic loads calculations performed on a digital computer. Recommendations for improvement of the analysis are made based on this comparison. (Author)

AD-616 849 Div. 1/4, 1/2, 1/5, 30/5

Systems Research and Development Service,
Federal Aviation Agency, Washington, D. C.
DESIGN FOR THE NATIONAL AIRSPACE UTILIZATION SYSTEM.
First ed.
30 Jun 62, 459p
Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C. 20402, HC$2.50, as FAA 2.2:Ai7/5.
Available from CFSTI MF$2.25.

Descriptors: (*Aeronautics, Systems engineering), (*Systems engineering, Aeronautics), Design, Aircraft, Aviation safety, Air traffic, Air traffic control systems, Airports, Aircraft equipment, Data processing systems.

A status report is given which presents a preliminary system design for airspace utilization involving the safe and efficient use of air vehicles.

AD-616 898 Div. 9/7
CFSTI Prices: HC$2.00 MF$0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
EXPERIMENTAL STUDIES OF LOW-DENSITY EFFECTS IN HYPERSONIC WEDGE FLOWS.
Technical rept.,
by R. J. Vidal and J. A. Bartz. Dec 64, 37p
Rept. no. AF-1500-A-2
Contract AF49 638 952
AFOSR 65-0335
Unclassified report

Prepared for presentation at the International Symposium on Rarefied Gas Dynamics (4th), Toronto, Canada, 14-17 Jul 64.

Descriptors: (*Heat transfer, Hypersonic flow), (*Wedges, Hypersonic characteristics), (*Hypersonic flow, Heat transfer), (*Boundary layer, Wedges), Superaerodynamics, Orifices, Shock waves, Continuum

mechanics, Pressure, Experimental data, Shock tunnels, Reynolds number, Theory, Density.

Experimental heat transfer and pressure data are presented which extend from the classical thin boundary layer regime to near-free-molecule flow (Knudsen numbers based on ambient stream conditions as large as 5). These data are compared with viscous shock layer theory for heat transfer and with theory for the combined effects of wedge angle and boundary layer displacement to define the theoretical range of validity and to identify the low density departures from boundary layer theory. It is noted that low density effects are first evident in the pressure data. It is concluded that the cause of these departures cannot be identified within existing solutions based on the Navier-Stokes relations. It is hypothesized that the departures might stem from second-order (Burnett) molecular effects. (Author)

AD-616 902 Div. 33/1, 23/1
CFSTI Prices: HC$6.00 MF$1.25

Federal Aviation Agency, Washington, D. C.
A REPORT ON THE DETERMINATION OF ENGINEERED STAFFING STANDARDS FOR MAINTENANCE OF INSTRUMENT LANDING SYSTEMS AND THE DEVELOPMENT OF A METHODOLOGY FOR DETERMINING ENGINEERED STAFFING STANDARDS FOR MAINTENANCE OF ALL AIR TRAFFIC CONTROL, AIR NAVIGATION, AND COMMUNICATION FACILITIES,
by Warren Lichtenberg, Hubert Minchow, and Fred Levey. 17 Dec 64, 226p

Unclassified report

Descriptors: (*Personnel management, Standards), (*Instrument landings, Systems engineering), (*Air traffic control systems, Maintenance), (*Navigation, Systems engineering), (*Communication systems, Systems engineering), Analysis, Personnel, Management engineering, Labor.

Engineered work element and staffing standards for maintenance of instrument landing systems are presented along with an analysis of the techniques used in their development. The approach taken in developing the standards and an analysis of the data gathered during the study are discussed. Work element standards are designed in such a manner that a bottom-up summation of the standards will provide useful input to the decision-making process. A methodology is offered for use in developing engineered standards for all facilities within the purview of the Systems Maintenance Service and for determining optimum maintenance policy. (Author)

AD-616 905 Div. 1/9, 26/6
CFSTI Prices: HC$3.00 MF$0.75

Western Gear Corp., Lynwood, Calif.
CYCLOIDAL CAM TRANSMISSION, PHASES II AND III.
May 65, 89p
Contract DA44 177TC651, Task 1M121401A14414
USAAML TR-64-13

Unclassified report

Descriptors: (*Helicopters, Transmission gears), (*Transmission gears, Cams), (*Cams, Transmission gears), Reduction gears, Performance(Engineering), Bearings, Effectiveness, Crankshafts, Wear resistance, Load distribution, Failure(Mechanics), Tests.

The report covers a discussion of the basic theory of operation of the cycloidal cam reducer and the results of load testing on two 280-horsepower units. During testing of the first unit, excessive deflection in the reverter cage assembly resulted in improper load distribution and in the failure of bearings and other components. The failure was analyzed, and modifications were incorporated in the second unit. Failure was experienced in the early stages of testing on the second unit. This failure has been attributed to excessive bearing internal clearance and end play that caused skewing of the crank shaft bearings and severe abrasion of the shaft. Although the second unit was much more efficient than the original, power losses and excessive complexity remain as factors limiting the application of the cycloidal cam reducer for helicopter main transmissions. (Author)

AD-616 943 Div. 1/5

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
SURVEY OF MILITARY SPORT PARACHUTING DEATHS,
by Frank W. Kiel. 1965, 3p

Unclassified report

Pub. in Aerospace Medicine v36 n4 p361-2 Apr 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aviation accidents, Parachute jumping), (*Parachute jumping, Accidents), Sources, Parachutes, Malfunctions, Hazards, Recreation, Analysis, Injuries, Impact shock, Training, Wind.

Sport parachuting has become a popular activity with military personnel, and many clubs have been organized and sponsored on bases throughout the world. As the number of jumpers has increased so has the number of deaths increased. There have been 27 military persons killed in sport parachuting through June 1964. In addition to the large problem of failure to activate the parachute there are other hazards also, such as hitting the airplane, colliding with another jumper, malfunctioning of the chute and landing in the water. Analysis of the accidents shows that one-third occurred during the preliminary training period but in others jumpers with long experience have died also. Wind appears to be a factor in inadvertent water landings, but other weather factors lack importance. (Author)

AD-617 012 Div. 9/6

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
SUPERSONIC FLUTTER OF A CIRCULAR CYLINDRICAL SHELL OF FINITE LENGTH IN AN AXISYMMETRICAL MODE,
by Hans Krumhaar. 14 Feb 64, 35p
Rept. no. Pub-602

Unclassified report

Pub. in International Journal of Solids Structures v1 p23-57 1965 (Copies available only to DDC users).

Descriptors: (*Structural shells, Flutter), (*Cylindrical bodies, Flutter), (*Flutter, Supersonic flow), Axially symmetric flow, Differential equations, Velocity, Reliability.

The flutter in an axisymmetrical mode of a simply supported thin cylindrical shell is studied. The linearized Timoshenko shell equations and linear piston theory lead to a non-self-adjoint eigenvalue problem which is investigated thoroughly and solved without further approximations. In this manner the critical speeds (flutter boundaries) are determined. Using these 'exact' results two checks can be made. A comparison of the exact results with those obtained by Galerkin's method proves the reliability of this method if applied to the present eigenvalue problem. On the other hand, a comparison of the exact result with experimental data will prove whether or not the physical assumptions upon which the eigenvalue is based are satisfactory. (Author)

AD-617 013 Div. 9/5, 25/8

Case Inst. of Tech., Cleveland, Ohio.
MELTING ABLATION ABOUT DECELERATING SPHERICAL BODIES,
by Simon Ostrach and Dudley C. McConnell. 1965, 12p
Grant AF AFOSR194 65
AFOSR 65-0924

Unclassified report

Pub. in AIAA Aerospace Sciences Meeting (2nd), New York, N. Y. 25-27 Jan 65.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ablation, Spheres), Melting, Deceleration, Boundary layer, Glass, Perturbation theory, Heat transfer, Surface properties, Gases, Liquids, Atmosphere entry.

The transient melting ablation of a glassy material is studied both analytically and experimentally. The purpose of the present investigation is to extend the analyses of Ostrach and coworkers by examining in more detail the initial period of melting, by re-examining the thermal boundary condition at the gas-liquid interface, and by considering a spherical body because of its relevance to the tektite problem; tektites are thought to have been spherical originally. Presented herein are a perturbation analysis, which starts from the initial state of conduction; and a long-time analysis, which starts from time-independent ablation. The results of these analyses are then compared with the results of experiments conducted in a vertical wind tunnel; the vertical wind tunnel makes possible the simulation of the deceleration force that acts upon a re-entry body. On the basis of this comparison, it is concluded that the analysis accurately predicts the salient features of the ablation process; and on the basis of experimental observation, a possible mode of melt-wave development is suggested. The paper concludes with comments upon the relationship of this work to the question of the origin of tektites. (Author)

AD-617 055 Div. 9/5, 25/8
CFSTI Prices: HC$2.00 MF$0.50

Fluid Mechanics Lab., Mass. Inst. of Tech., Cambridge.
HEAT TRANSFER FROM ARGON AND XENON TO THE END-WALL OF A SHOCK TUBE,
by Harvey S. Friedman and James A. Fay.
May 65, 34p Pub-65-2
Contract AF49 638 1396 Unclassified report

Descriptors: (*Heat transfer, Helium group gases), (*Argon, Heat transfer), (*Xenon, Heat transfer), Shock tubes, Aerodynamic characteristics, Convection, Thermal radiation, Thermometers, Gas ionization, Thermodynamics.

Heat transfer from argon and xenon to the end-wall of a shock tube was measured by using a thin-film heat transfer gage whose temperature rise is monitored by an infrared photocell. For the range of incident shock Mach numbers tested, between 9 and 13 in argon and 13 and 18 in xenon, partial ionization would exist behind the reflected shock wave if thermodynamic equilibrium were achieved. By extrapolation of measured ionization rates for these gases, it was concluded that no ionization occurred behind the reflected shock wave in argon but that equilibrium was achieved in xenon, at least for the period during which the heat transfer was measured. Calculations of the heat transfer, made in accordance with existing theories for the corresponding thermodynamic state of the gas, were found to be in good agreement with the experimental measurements. (Author)

AD-617 107 Div. 9/7, 9/8, 12/1
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
A REVIEW OF HYPERSONIC WAKE STUDIES,
by P. S. Lykoudis. May 65, 89p
Memo no. RM-4493-ARPA
Contract SD79, ARPA Order 189 61

Unclassified report

Descriptors: (*Wake, Hypersonic characteristics), (*Hypersonic flow, Wake), (*Reentry vehicles, Wake), Reviews, Atmosphere entry, Laminar flow, Turbulence, Bibliographies, Fluid mechanics, Blunt bodies, Slender bodies, Separation.

A critical summary of studies in the fluid mechanics of hypersonic wakes formed behind vehicles of different geometries. The memorandum reviews both the history and the special problems of the field, and gives special attention to such issues as the laminar regime, transition to turbulence, and turbulence. (Author)

AD-617 129 Div. 1/9
CFSTI Prices: HC$3.00 MF$0.75

Walker (Norman K.) Associates, Inc., Bethesda, Md.
ROLL STABILITY OF GROUND EFFECT MACHINES-THICK ANNULAR JET AND PLENUM TYPES.
Final rept. for May-Oct 63,
by Norman K. Walker, David A. Shaffer, Alastair Anthony, and Richard Brooks. Jun 65, 66p
Rept. no. 13
Contract DA44 177AMC19T, Proj. 1D021701A04802
USAAML TR-65-27

Unclassified report

Descriptors: (*Ground effect machines, Hovering), (*Hovering, Ground effect machines), Stability, Roll, Aerodynamic characteristics, Model tests, Stabilization, Jets, Moments.

An electrically powered model Ground Effect Machine, first arranged with a thick annular jet and second as a simple plenum chamber, was used in an investigation of the roll stability in hovering flight. The lift, height, and power relationship was determined and the restoring moment and side force due to inclination to the ground were measured. In the annular jet version, the restoring moment was proportional to roll angle and changed little with flying height. The side force on body axes was zero at heights less than the jet width and slightly negative (that is, towards, the high side of the machine) at greater flying height. The plenum chamber version had little or no restoring moment but had positive side force, expressible as a rotation of the lift vector through an angle greater than the roll angle. This effect increased with height, from a ratio 1.14 up to 1.8 at the greatest height tested. Both versions were dynamically stable in their various ways and were little affected by the variation in CG height. The addition of outward-curved fairings at the lower edges of the plenum chamber made the model strongly stable, with a finite restoring moment and a lift vector rotation to twice the roll angle, but reduced the hover height. (Author)

02. Agriculture

AD-616 725 Div. 32/1, 6/4
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
REPEATED FLOWERING OF INTRODUCED PLANTS,
by B. N. Golovkin and G. N. Andreev. Dec 63,
10p Trans-978
TT 65-62505

Unclassified report

Trans. of Botanicheskii Zhurnal (USSR) v48 n1 p113-8 1963.

Descriptors: (*Plants(Botany), Fruits), Growth, Seeds, Climatology, Morphology(Biology).

AD-616 936 Div. 16/14, 16/10

Army Medical Research and Nutrition Lab., Denver, Colo.
MUCOID IMPACTION OF THE CANINE BRONCHI,
by M. W. Castleberry, J. F. Ferrell, L. D. Jones, and C. H. Garvin. 1965, 4p Unclassified report

Pub. in Journal of the American Veterinary Medical Association v146 n6 p607-10 Mar 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Respiratory diseases, Dogs), Mucus, Bronchi, Obstruction(Physiology), Respiratory system, Diseases, Lungs, Antibiotics, Diagnosis, Therapy, Histological techniques, Veterinary medicine.

Mucoid bronchial impaction similar to that occasionally seen in man was diagnosed in a Wire Fox Terrier at necropsy. The primary lesion was multistage lobular pneumonia involving most of the lung. Many of the larger bronchi were obstructed with an odorless, granular, mildly adhesive, gray-green mucoid mass. Subsequent histologic examination of the areas below the blocked and dilated bronchi revealed cystic bronchiectasis, with mucous acinar and goblet cell hyperplasia and diffuse interstitial pneumonitis. (Author)

AD-617 075 Div. 32/1, 16/6
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
PROBLEMS OF OCCUPATIONAL HYGIENE IN AGRICULTURE AS DISCUSSED AT A SYMPOSIUM IN SARATOV,
by V. N. Kozlov. Feb 64, 5p Trans-1017
TT 65-62521

Unclassified report

Trans. of Gigiena Truda i Professionalnye Zabolevaniya (USSR) v7 n5 p59-60 1963.

Descriptors: (*Agriculture, Public health), (*Public health, Rural areas), (*Industrial medicine, Agriculture), Machines, Sanitary engineering, Toxicity, Symposia, USSR.

03. Astronomy and Astrophysics

AD-616 537 Div. 2/1, 2/8
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
COMPARISON OF COLOR AND COEFFICIENTS OF BRIGHTNESS OF DIFFERENT REGIONS ON THE LUNAR SURFACE WITH SOME TERRESTRIAL ROCKS,
by N. P. Barabashov and A. T. Chekirda.
Apr 65, 12p RSIC-403
TT 65-62493

Unclassified report

Trans. of Astronomicheskii Zhurnal (USSR) v33 n4 p549-55 1956.

Descriptors: (*Moon, Optical properties), (*Rock(Geology), Optical properties), (*Colors, Moon), (*Brightness, Moon), Analysis of variance, Spectra(Infrared), Photographs, Surface properties, Terrain, Reflection, Volcanoes, Geology, USSR.

A comparison of the color and the coefficients of brightness of typical lunar formations with those of some terrestrial substances was made by photographic observations with five light filters: infrared, red, green, blue and ultraviolet. This comparison shows that the reflecting power of the lunar surface for the solar spectrum increases towards the red and infrared parts of the spectrum. This is especially noticeable for some mountainous regions and maria, as for example the central part of Mare Serenitatis and of some others. Most of the maria are green. The reflecting power of some areas of the lunar surface is very low in the ultraviolet. For other areas it is high. Some areas show anomalies in the infrared. It can be concluded that of the substances investigated, the following are most similar to the lunar surface: red quartz porphyry, quartz sandstone, auripigmentum, volcanic tuff and volcanic ashes from Kamchatka. A comparison with quartzitic sandstone and auripigmentum can hardly be real, but a comparison with volcanic effusional substances is genetically probable.

AD-616 538 Div. 2/1
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
CHANGES IN BRIGHTNESS OF LUNAR DETAILS DEPENDENT ON THE AZIMUTH AND IN PROFILES OF LUNAR INDICATRICES,
by N. P. Barabashov. Apr 65, 14p RSIC -398
TT 65-62494

Unclassified report

Trans. of Akademiya Nauk SSSR. Komissiya po Fizike Planet. Izvestiya v3 p31-40 1961.

Descriptors: (*Moon, Brightness), (*Brightness Azimuth), Reflection, Terrain, Microstructure, Surface properties, Tables, Factor analysis, USSR.

The dependency of the brightness of lunar objects on different azimuths of the incident and reflected rays is studied. The effect of the different azimuths is shown. The cited sectional indicatrices are for i = 30 degrees, i = 60 degree planes, passing through the incident ray and perpendicular to the plane of incidence. The conclusions drawn are that these studies further confirm the condition of similarity of microreliefs of the lunar surface, and that the changes in brightness of the lunar seas and continents are dependent on azimuth changes and comparable to the data for crushed tuff, the size of which ranges from 2-6 mm.

AD-616 580 Div. 2/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
COMMENTS ON 'THE EFFECT OF MICRO-METEORITES ON REFLECTING SURFACES',
by R. L. Bjork. 29 Feb 60, 11p
Rept. no. P-1936

Unclassified report

Prepared for presentation at the National meeting of the Institute of Environmental Science, 6-8 Apr 60, Los Angeles, Calif.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Meteorites, Terminal ballistics), Reviews, Surfaces, Physical properties, Cratering, Density, Space environmental conditions.

A summary and critique is given of a paper by R. E. Henderson and P. Stanley, entitled 'The effect of micrometeorites on reflecting surfaces,' which was presented at the 1960 meeting of the Institute of Environmental Science and published in the proceedings of that meeting.

AD-616 646 Div. 2/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ANALYSIS OF POSSIBLE LUNIK III PICTURE HOAX,
by Merton E. Davies. 1 Apr 60, 8p
Rept. no. P-1969

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Moon, Photographs), (*Space flight, Photography), Space communication systems, Signal-to-noise ratio.

Speculations are made regarding the credibility of the charges of the 1960 magazine articles that the pictures of the back side of the moon taken by the Lunik III payload may have been faked. The suggestion is made that at the time that Lunik III broadcast its many pictures, it is likely that, because of the great distance and low transmitter power, the signal-to-noise ratio was to low that no two of the resulting pictures looked alike. Because of interference and noise the pictures would be distorted and blotchy. The best procedure in the presence of noise is to use a statistical approach and to determine, from many samples, the most likely shape and location of each formation. A composite picture was most likely made that would represent the best, or most probable, view of the back of the moon. The composite was then annotated with the names and descriptions of the physical features. The two other released pictures were retouched in such a way as to resemble this picture and at the same time illustrate typical results from each of the two lenses.

AD-616 651 Div. 2/1
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.

PROBLEMS AND CONCEPTS OF GENERAL PLANETOLOGY,
by Stephen H. Dole. 15 Apr 60, 36p
Rept. no. P-1970
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Planets, Physical properties), Chemical properties, Planetary atmospheres, Exosphere, Density, Temperature, Velocity, Stars, Gases, Mars, Mercury(Planet), Earth, Venus, Plato, Uranus, Saturn, Jupiter.

The concept of treating planets as members of a general class of non-self luminous objects is introduced. Planets are shown to occupy the mass range roughly between 0.00001 to 10,000 earth masses (10 to the 23rd to 32d grams), objects above this mass range being stars and below this mass range being classified as meteoroids or asteroids. Planets are further classified into types as: (1) airless bodies; (2) planets with light atmospheres and (3) planets with massive atmospheres, the type being dependent on surface escape velocity and exosphere temperature. Some relationships among fundamental properties of planets are discussed: mean density vs. radius; atmospheric composition as a function of exosphere temperature and velocity of escape; and oblateness as a function of rotational velocity, mean density and internal density distribution. Some unresolved problem areas of general planetology are indicated. (Author)

AD-616 668 Div. 2/1, 12/1

RAND Corp., Santa Monica, Calif.
LIMITS FOR STABLE NEAR-CIRCULAR PLANETARY OR SATELLITE ORBITS IN THE RESTRICTED THREE-BODY PROBLEM,
by S. H. Dole. 18 May 60, 24p Rept. no. P-1992
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale. The test of this paper is to be submitted to ARS Journal for publication.

Descriptors: (*N-body problem, Circular orbit trajectories), (*Circular orbit trajectories, N-body problem), Center of mass, Celestial mechanics, Graphics, Orbital trajectories.

In the vicinity of two massive bodies rotating in circles around their common center of mass there are regions in which near-circular orbits of a third body are stable and other regions in which near-circular orbits are unstable. Expressions for calculating the limiting radii of the regions where stable near-circular orbits can exist are developed from Jacobi's integral to the equations of motion of a particle and computed quantitative values for these radii are given in graphical and tabular form for mass-ratios from 10 to the minus 8th power to 0.5. An example is given of the application of these limits to an idealized Earth-Moon system (mass ratio, 0.012128563). (Author)

AD-616 775 Div. 2/1, 2/7
CFSTI Prices: HC$1.00 MF$0.50

Air Force Cambridge Research Labs., Bedford, Mass.
EVAPORATION OF THE SOLAR CORONA INTO INTERPLANETARY SPACE.
Environmental research papers,
by Hari K. Sen. May 65, 21p
Rept. nos. AFCRL-65-318: ERP-103
Proj. 8647, Task 864701
Unclassified report

Descriptors: (*Solar corona, Evaporation), (*Interstellar matter, Solar corona), Exosphere, Kinetic theory, Gases, Solar wind, Voltage, Gravity, Protons.

A simple kinetic theory model of the interplanetary gaseous medium based on the evaporation of particles from the solar coronal exosphere is considered, using Jeans' equation for the escape of gases from planetary atmospheres. The exosphere is fixed in the corona at a level (four times the solar radius) where the mean free path is comparable with the scale height. Equality of flux for the protons and electrons at the exosphere is assumed, so that the sun may not build up an inordinately high charge. Ingham's density value is used at the exosphere, where the temperature is assumed to be 1,000,000 degrees K. The electric potential at the exosphere is found to be about 488 volts and is almost equal and opposite to the gravitational potential for the protons so that the protons are virtually weightless. Computed particle density values are in good agreement with the observational data of van de Hulst, Vitkevitch and Slee. The theoretical proton (particle) flux and velocity near the earth are, respectively, 1.47 x 10 to the 8th power 1/sq-cm sec, and 147 km/s. These values are in order-of-magnitude agreement with the Lunik II, Explorer X, and Mariner II data. The order-of-magnitude agreement does not depend critically on the value at the exospheric level or on making the protons actually weightless. (Author)

AD-616 805 Div. 2/1, 2/7

Harvard Coll., Cambridge, Mass. Observatory.
THE MICROWAVE PHASE EFFECT OF VENUS,
by James B. Pollack and Carl Sagan. 30 Dec 64, 43p
Unclassified report

Pub. in Icarius v4 n1 p62-103 Feb 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Venus, Surface properties), Microwave spectroscopy, Temperature, Brightness, Physical properties, Thermal conductivity, Extraterrestrial radio waves, Radio astronomy, Planetary atmospheres, Moon, Earth, Celestial mechanics.

An attempt is made to demonstrate that the theory of thermal conduction and radiative transfer in solids can provide a self-consistent explanation of the observed phase effect as a function of wavelength. A comparison of the observational and theoretical forms of the brightness temperature will generate numerical values of parameters which are functions of the Cytherean surface properties. Comparison will be made with thermal and electrical properties of geochemically abundant materials. The theory is potentially rich in information about Venus, providing new data on the obliquity and sense of rotation of Venus, on the possible composition and structure of its surface, and on the thermometric temperature distribution with position on the disk, with depth, and with time.

AD-616 813 Div. 2/1, 2/8

Harvard Univ., Cambridge, Mass.
TOTAL REFLECTION SPECTROPHOTOMETRY AND THERMOGRAVIMETRIC ANALYSIS OF SIMULATED MARTIAN SURFACE MATERIALS,
by Carl Sagan, Jean P. Phaneuf, and Michael Ihnat.
1 Dec 64, 19p
Unclassified report

Pub. in Icarus v4 n1 p43-61 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mars, Reflection), (*Minerals, Mars), Spectroscopy, Spectra(Visible + ultraviolet), Spectra-(Infrared), Thermal properties, Oxides, Silicates, Iron compounds, Albedo(Astronomy), Space biology.

The ultraviolet, visible, and near infrared reflection spectra of the Martian bright areas were compared with the corresponding laboratory reflectivities, measured with an integrating sphere, of a variety of minerals containing ferric oxides and silicates, as solids and in pulverized form. Except in the ultraviolet, where the effects of the Martian blue haze are prominent, pulverized limonite, a ferric oxide polyhydrate, matches the shape and amplitude of the Martian Russell-Bond albedo within experimental and observational error. Further observational tests of this identification are outlined. If water-rich limonite is a primary constituent of the Martian bright areas, conditions in the earlier history of Mars were probably much more equable than contemporary conditions, and the origin and evolution of life on primitive Mars becomes easier to understand. (Author)

AD-616 832 Div. 2/1, 20/2

Minnesota Univ., Minneapolis. School of Physics.
COMMENT ON A PAPER BY G. KENNETH YATES, 'SOLAR FLARE HIGH ENERGY ALPHA PARTICLES AND THEIR STORAGE IN INTERPLANETARY SPACE,'
by C. J. Waddington and P. S. Freier.
23 Sep 64, 2p
Unclassified report

Pub. in Journal of Geophysical Research v70 n1 p230-1 Jan 1 1965 (Copies not available to DDC or Clearinghouse customers).
Revision of manuscript received 20 Aug 64.
Yates' paper, AD-614 217, pub. in Journal of Geophysical Research v69 n15 p3077-95 Aug 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Solar flares, Alpha particles), (*Alpha particles, Solar flares), (*Astrophysics, Solar flares), Cosmic rays, Helium, Nuclei, Radiation measurement systems.

AD-616 860 Div. 2/1, 12/1

Defence Research Telecommunications Establishment, Ottawa (Ontario).
SOLAR NOISE OBSERVATIONS FROM THE ALOUETTE SATELLITE,
by T. R. Hartz. 30 Aug 64, 7p
Unclassified report

Abstract in French, English and Russian.
Pub. in Annales d'Astrophysique v27 n6 p831-6 Nov-Dec 1964 (Copies available only to DDC users).
Rept. presented to the Symposium on Astronomical Observations made by Spatial Vehicles (23rd), Liege, Belgium, 17-29 Aug 64.

Descriptors: (*Satellites(Artificial), Extraterrestrial radio waves), (*Extraterrestrial radio waves, Satellites(Artificial)), Solar corona, Temperature, frequency, Canada.

Solar radio noise in the frequency range 1.5 to 10 MHz appears sporadically in the Alouette sweep-frequency recordings above the galactic noise level. The type III bursts can be readily identified, but other spectral types are much more difficult to identify from only the satellite records. Using a plausible model for the coronal electron densities, the Type III frequency drift curves have been interpreted as corresponding to a source velocity in the range 0.1 to 0.15 times the velocity of light. Preliminary estimates have also been made of the coronal temperatures from some of the burst durations. Other solar noise events of longer duration have not been classified other than as enhanced solar noise at this stage. These enhancements frequently show an intensity structure, extending down to the 1.5 MHz lower frequency limit of the equipment. (Author)

AD-616 861 Div. 2/1, 12/1

Defence Research Telecommunications Establishment, Ottawa (Ontario).
OBSERVATIONS OF THE GALACTIC RADIO EMISSION BETWEEN 1.5 AND 10 MHz FROM THE ALOUETTE SATELLITE,
by T. R. Hartz. 30 Aug 64, 9p
Unclassified report

Abstract in French, English and Russian.
Pub. in Annales d'Astrophysique v27 n6 p823-9 Nov-Dec 1964 (Copies available only to DDC users).
Rept. presented to the Symposium on Astronomical Observations made by Spatial Vehicles (23rd), Liege, Belgium, 17-29 Aug.

Descriptors: (*Satellites(Artificial), Extraterrestrial radio waves), (*Extraterrestrial radio waves, Satellites(Artificial)), (*Galaxies, Extraterrestrial radio waves), Satellite antennas, Electrical impedance, Temperature, Frequency, Canada.

Since September 29, 1962, a sweep-frequency receiver covering the range 0.5 to 12 MHz has been operating in a 1000 km height, 80.5 inclination orbit about the earth for about 5 hours a day on the average. The spectrum of the galactic radio emission between 1.5 and 5 MHz has been determined fairly reliably. Although there is no provision for absolute gain calibration of the receiver in flight, the data are so consistent as to give confidence to the pre-flight calibration. The greatest uncertainty hinges on the effects of the ionization on the antenna impedances. To evaluate these, galactic noise measurements have been made under a variety of local electron densities and different magnetic field strengths: these values have then been extrapolated to zero electron density and the free space values obtained by this extrapolation procedure are taken as a measure of the galactic emission. At 2.3 MHz the brightest region of the galaxy is centred on the south galactic pole and has a temperature of about 1.8 x 10,000,000 K. The lowest temperature, about 5.0 x 1,000,000 K, at 2.3 Mc/s was found for the region centred on R. A. 9 hr., dec + 75. (Author)

AD-616 899 Div. 2/1, 2/2
CFSTI Prices: HC$4.00 MF$1.00

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
SOME MORPHOMETRIC PROPERTIES OF THE LUNAR SURFACE: A PRELIMINARY INVESTIGATION FROM LUNAR AERONAUTICAL CHARTS.
Internal research rept.,
by Richard J. Pike. 21 Aug 64, 120p
Rept. nos. IR-86-141, VS-1985-C-1
Unclassified report

Descriptors: (*Moon, Mapping), (*Mapping, Moon), Lunar environment, Extraterrestrial topography, Terrain, Maps, Astronomy.

A numerically-expressed and relatively objective

system of topographic description which was used to delimit homogeneous 'terrain regions' in Central Europe is applied to the lunar surface, hoping to delimit reasonably homogeneous topographic regions, and then use the numerical descriptions of these regions to infer, statistically, the configuration of the lunar surface at a scale far below that from which the basic data were taken. The principal objective is to be a prediction of surface roughness, an estimation of the configuration of the microterrain upon which projected manned vehicles would have to land or over which they would maneuver.

AD-616 927 Div. 2/1
CFSTI Prices: HC$1.00 MF$0.50

Manchester Univ. (England).
THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO STARS BY THE LUNAR OCCULTATION TECHNIQUE AND OBSERVATIONS OF GALACTIC AND EXTRA-GALACTIC EMISSION AT 408 Mc/s.
Progress rept. no. 1, Oct-Dec 64,
by Conrad H. Slater, C. G. T. Haslam, and M. J. S. Quigley. Dec 64, 11p
Contract N62558 3928 Unclassified report

Descriptors: (*Radio astronomy, Position finding), (*Position finding, Radio astronomy), (*Astrophysics, Radio astronomy), Stars, Extraterrestrial radio waves, Ultrahigh frequency, Data processing systems.

AD-616 991 Div. 2/1
CFSTI Prices: HC$2.00 MF$0.50

Oslo Univ. (Norway).
ON SOME PROPERTIES OF SOLAR RADIO BURSTS OF SPECTRAL TYPE III.
Scientific rept.,
by Oystein Elgaroy and Harald Rodberg.
23 Aug 64, 32p Rept. no. SR-24(46)
Contract AF61 052 186
AFCRL 65-385 Unclassified report

Pub. in Astrophysica Norvegica v8 n9 p271-301 1963.

Descriptors: (*Radio astronomy, Solar flares), (*Solar flares, Radio astronomy), (*Astrophysics, Radio astronomy), Solar corona, Extraterrestrial radio waves, High frequency, Very high frequency, Plasma physics, Radio receivers.

Solar type III bursts were observed with a swept frequency receiver in the 200 Mc/s range. A mean frequency drift velocity of - 60 Mc/sq s is found. The observed distribution of bursts of different drift velocities agrees with a calculated distribution curve based on other experimental data and simple assumptions. The time profile of the bursts is slightly asymmetrical, and it is possible to explain the profile from a simple model of the type III phenomenon. The analysis leads to a burst band-width of about 25 Mc/s. If the band-width depends on the size of the exciting disturbance, the source size is about 0.05 solar radu at the 200 Mc/s plasma level in the corona. Evidence of an increase in the source size on the way out through the corona is presented. The damping constant of the excited oscillations is larger than previously expected. If it is identified with the collision frequency between electrons and ions, a temperature of 2,000,000K is found for the active region corona. (Author)

AD-616 992 Div. 2/1
CFSTI Prices: HC$2.00 MF$0.50

Oslo Univ. (Norway).
SECULAR VARIATIONS OF LONG-LIVED SUNSPOTS.
Scientific rept.,
by Truls S. Ringnes. 17 Sep 64, 40p
Rept. no. SR-27(49)
Contract AF61 052 186
AFCRL 65-387
Unclassified report

Pub. in Astrophysica Norvegica v8 n10 p303-40 1964.

Descriptors: (*Sunspots, Periodic variations), (*Astrophysics, Sunspots), Distribution, Tables, Graphics.

Number and area distribution of spot groups of intermediate and long lifetimes have been studied in the period 1889-1954, as well as the area development curves of individual long-lived spots in the period 1914-1954. Eigenson's recurrence indices have been revised. Various secular variations have been found. (Author)

AD-617 008 Div. 2/1, 30/3
CFSTI Prices: HC$1.00 MF$0.50

Oslo Univ. (Norway).
PHOTOELECTRIC PHOTOMETRY OF SUNSPOTS, A PRELIMINARY REPORT. II. THE PINHOLE PHOTOMETER.
Scientific rept.,
by Eberhart Jensen, Per Ofstad, and Gunnar Eriksen.
Aug 63, 25p Rept. no. SR-26(48)
Contract AF61 052 186
AFCRL 65-386
Unclassified report

Descriptors: (*Sunspots, Measurement), (*Photometers, Sunspots), Intensity, Test equipment, Design.

In the first part of the report photometric observations of 25 sunspots obtained in 1959 at the Oslo Solar Observatory are discussed. In the second part the photometer used for the observations is described. (Author)

AD-617 037 Div. 2/1

Harvard Coll., Cambridge, Mass. Observatory.
POLARIZATION OF THERMAL EMISSION FROM VENUS.
Revised ed.,
by James B. Pollack and Carl Sagan. 7 Nov 64, 23p
Unclassified report

Pub. in Astrophysical Journal v141 n3 p1161-83 Apr 1 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 8 Sep 64.

Descriptors: (*Venus, Thermal radiation), (*Thermal radiation, Venus), (*A strophysics, Venus), Polarization, Electromagnetic waves, Astronomical data, Graphics, Tables, Interferometers.

Thermal emission from a specific locale on a planetary surface is, in general, polarized, because the emissivities parallel and perpendicular to the plane of incidence are unequal. A radio telescope unable to resolve the planet will observe a net polarization in the thermal emission for appropriate asymmetries in the surface distribution of temperature, T, or dielectric constant, epsilon. Illustrative calculations indicate that the integrated polarization of the 3-cm radiation from Venus is probably between 0.35 and 2 per cent, which is close to or slightly below the capability of existing radio telescopes. A possibly more promising method of determining the polarization of Venus radio emission is provided by interferometry. Under certain, probably valid, approximations, a complete set of observations with one-dimensional resolution across the planetary

disk can obtain the two-dimensional distribution of epsilon and T across the disk, and the obliquity of the axis of rotation. The observed integrated brightness-temperature phase effect requires a surface temperature difference between subsolar and antisolar point approximately 400 K. An analysis is made of the incomplete set of interferometric observations of Venus obtained at Owens Valley Radio Observatory by Clark and Spencer. These observations are shown to be consistent with the radar reflectivity and microwave phase effect of Venus if the surface temperature varies markedly (approximately 500 K) between the subsolar point and the pole. (Author)

04. Atmospheric Sciences

AD-616 453 Div. 2/7, 22/6

Iowa State Univ., Iowa City.
ARTIFICIAL RADIATION BELTS,
by J. A. Van Allen. 1965, 4p
Contract Nonr150906

Unclassified report

Pub. in McGraw-Hill Yearbook Science and Technology p107-8 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Upper atmosphere, Radioactive fallout), (*Radioactive fallout, Upper atmosphere), Terrestrial magnetism, Particles, Nuclear explosions, Reviews, Magnetic fields, Geophysics, Magnetohydrodynamics, Aurorae.

AD-616 501 Div. 2/7

RAND Corp., Santa Monica, Calif.
UPPER ATMOSPHERE STUDIES,
by William W. Kellogg. 16 Jan 60, 13p
Rept. no. P-1876

Unclassified report

Available only for reference use at DDC field Services. Copy is not available for public sale.

Descriptors: (*Upper atmosphere, Scientific research), Atmospheric sounding, Meteorological balloons, Sounding rockets, Meteorological satellites, Van Allen radiation belt.

AD-616 504 Div. 2/7, 30/5

RAND Corp., Santa Monica, Calif.
THE ACCURACY OF WINDS DERIVED BY THE RADAR TRACKING OF CHAFF AT HIGH ALTITUDES,
by R. R. Rapp. 7 Jan 60, 25p
Rept. no. P-1879-NSF

Unclassified report

Available only for reference use at DDC Field services. Copy is not available for public sale.

Descriptors: (*Wind, Measurement), (*Radar tracking, Wind), High-altitude, Meteorological radar, Errors, Velocity.

The accuracy and significance of a series of wind measurements at Johnston Island are discussed. The manner in which the chaff responds to changes in the wind is deduced from the observed rates of fall. The standard error of the wind determination due to random errors of tracking is estimated statistically. It is shown that day to day variations of the wind at a level are detectable with this type of measurement but that day to day variations of the shear are masked by instrumental error. The mean shear over the 3-day period, however, is found to be real and may be due to a change in wind regime associated with the temperature minimum near 80 km. (Author)

AD-616 530 Div. 2/7, 2/9
CFSTI Prices: HC$1.00 MF$0.50

Naval Postgraduate School, Monterey, Calif.
THE DETERMINATION OF RICHARDSON NUMBER AND ROUGHNESS PARAMETER AT OCEAN VESSEL VICTOR.
Master's thesis,
by Larry M. Riley. 1965, 25p

Unclassified report

Descriptors: (*Atmosphere, Turbulence), (*Oceans, Meteorological parameters), Wind, Atmospheric temperature, Convection, Boundary layer, Oceanographic vessels, Iterative methods.

Research on wind and temperature profiles over land have established a number of fundamental relationships that are tested here over an oceanic location. Most attempts at calculating the roughness parameter over oceanic surfaces have been based on surface-layer theories, and often employ an iterative procedure in approaching the sea surface. A similarity relationship between the wind and temperature-profiles is employed, using data at ship 'Victor' appropriate to forced convective theory, as defined by Priestley. The theory of forced convection, as applied here, makes it necessary to compute the Richardson number and the Monin-Obukhov scale length as preliminaries to the computation of roughness parameter. The roughness parameter and friction velocity are obtained from the theory using an iterative procedure. The wind speed at 20 meters is correlated against scale length and roughness parameter. The latter makes very little contribution to the variance of the windspeed while the scale length contributes in a manner reasonably expected from theory. (Author)

AD-616 536 Div. 2/3
CFSTI Prices: HC$2.00 MF$0.50

Naval Postgraduate School, Monterey, Calif.
A DIAGNOSTIC STUDY AT 100MB OF THE ZONALLY-AVERAGED FIELDS OF HEAT STORAGE, HEAT TRANSPORT AND DIABATIC HEATING IN THE NORTHERN HEMISPHERE DURING EARLY APRIL 1963.
Master's thesis,
by Terry J. McCloskey. 1965, 36p

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Northern Hemisphere, Climatology), (*Climatology, Northern Hemisphere), Temperature, Atmospheric motion.

The diabatic heating rate at 100mb is determined from the thermodynamic equation, utilizing previous calculations of the potential function X and the 'vertical velocity' for the period 1-5 April 1963. The four basic terms of the expanded thermodynamic equation; storage, stream-velocity, X-potential advection, and vertical heat transport are examined individually, and added to obtain Q, the diabatic heating rate which is compared to the results of previous investigations. The zonally-averaged heating rates are discussed in terms of stratosphere circulations and their associated physical mechanisms. (Author)

AD-616 550 Div. 2/7, 8/6
CFSTI Prices: HC$1.00 MF$0.50

Lightning and Transients Research Inst., Minneapolis, Minn.
TRIGGERED LIGHTNING DISCHARGES AND APPLICATION TO V.L.F. PROPAGATION STUDIES.
Final rept. pt. 1,
by M. M. Newman. Oct 64, 23p
Rept. no. L-T-417

Contract AF19 604 7984, Proj. 8653
AFCRL 64-859 I

Unclassified report

Descriptors: (*Lightning, Measurement), (*Thunderstorms, Electric discharges), Very low frequency, Propagation, Whistlers, Ionospheric propagation, Atmospheric electricity.

Natural lightning discharge observations in VLF propagation studies would be greatly helped by direct measurements of the lightning discharge currents corresponding to received wave shapes at various locations. Consequently a technique for triggering, recording and identifying natural lightning discharges has been evolved by rocket-launching a conducting wire into charged thunderstorm clouds, and superposing a 1000 mega-watt peak radiated power 'signature' pulse. Thunderstorm areas of greatest overhead charge intensity were followed by monitoring gradient variations at sea, with an initial frequency of triggering of two discharges brought down out of five rocket firings of 1000 ft wires. Corona current measurements on the wire on the way up indicated negligible disturbance of the cloud charge before the actual lightning stroke was triggered. The triggering wire was vaporized but the consequent lightning discharge current continued to flow along the path of the wire through current measuring shunts which provided accurate oscillographic recording of the lightning discharge current wave shape. Extended use of the technique of triggering natural lightning should permit recording of at least a few lightning discharges which simultaneously produce whistlers. Coordinated observations at various laboratories should provide further useful data on ionospheric and whistler mode propagation. (Author)

AD-616 569 Div. 2/7, 9/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A COMPARISON OF HYDRODYNAMIC AND ELECTROSTATIC FORCES ON CLOUD DROPLETS,
by J. D. Sartor and M. H. Davis. 23 Feb 60, 11p
Rept. no. P-1920

Unclassified report

Prepared for presentation at the Weather Radar Conference (8th), San Francisco, 11-14 Apr 60, and to be published in the Proceedings of the Conference. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Raindrops, Electrostatic fields), (*Fluid dynamic properties, Raindrops), (*Electrostatic fields, Raindrops), Clouds, Atmospheric precipitation, Electrostatic precipitation.

The hydrodynamic and electrostatic forces on cloud droplets have been computed. 'Exact' solutions to the two body problems of hydrodynamics and electrostatics are used to give the forces between cloud droplets of arbitrary size falling freely in an arbitrary uniform electrostatic field. The RAND Corporation's Johnniac and IBM-704 were used for the numerical calculations. (Author)

AD-616 592 Div. 2/7
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NOTE ON THE DIRECTION OF HIGH AURORAL ARCS,
by E. H. Vestine. 4 Apr 60, 26p
Rept. no. P-1957-NSF Unclassified report

Descriptors: (*Aurorae, Luminescence), (*Terrestrial magnetism, Aurorae), Charged particles, Magnetic fields, Van Allen radiation belt, Electrons.

The relationships between geomagnetic micropulsations and pulsations in auroral luminosity are considered. Several features of these are found to be compatible with the concept of drainage of trapped radiation in the region of the outer Van Allen radiation belt in the Western Hemisphere. Certain homogeneous auroral arcs noted by Stormer at height 200 km in central Norway have a mirror point for trapped particles computed to be below ground level in the south Indian Ocean, a region likely to need surveys of the earth's main field. The magnetic field gradients near the night time electrojets near the northern and southern auroral zones will change the sign of drift of auroral particles, so that electrons spiralling up or down the geomagnetic field lines may drift westward in some regions and eastward in others. The gradients of the transient electrojet fields may help in explaining many of the complex features of auroral forms, when aurora are formed by incoming charged particles. (Author)

AD-616 593 Div. 2/7
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SOME ELECTROSTATIC CLOUD-DROPLET COLLISION EFFICIENCIES,
by J. Doyne Sartor. 4 Apr 60, 15p
Rept. no. P-1960

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Clouds, Drops), (*Raindrops, Electrostatics), (*Atmospheric electricity, Raindrops), Aerosols, Motion, Hydrodynamics, Electrostatic fields, Trajectories, Integration, Atmospheric precipitation.

Recent electrostatic and hydrodynamic solutions to the two body problem of the forces on neighboring spheres are combined to obtain the motion of cloud droplets in a uniform electrostatic field. Collision efficiencies are obtained from the relative trajectories of one droplet with respect to another both with and without the electrostatic field. The collision efficiencies are compared to demonstrate the effect of electrostatic fields in the initial stages of droplet accretion. It is concluded that fields commonly observed in clouds can play an important role in the collision and coalescence of the droplets. (Author)

AD-616 607 Div. 2/7, 8/6
CFSTI Prices: HC$3.00 MF$0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
IONOSPHERIC BACKSCATTER OBSERVATIONS AT MILLSTONE HILL,
by John V. Evans. 22 Jan 65, 76p
Technical rept. no. TR-374
Contract AF19 628 500
ESD TDR-65-34

Unclassified report

Descriptors: (*Radar reflections, Ionosphere), (*Ionosphere, Radar reflections), Electron density, Signal-to-noise ratio, Parabolic antennas, Ions, Temperature.

Studies of the electron-density, electron and ion temperatures in the F-region were made by means of

ground-based radar observations at the Millstone Hill Radar Observatory. A 70-meter parabolic antenna directed vertically and a 2.5-Mw pulse radar operating at 440 Mcps were employed for these measurements which were conducted for periods of 30 hours at approximately weekly intervals throughout 1963. Examination of the echo power as a function of height leads to a profile of electron density with height, provided the electron and ion temperatures are the same (T sub e = T sub i). Additional measurements of the spectra of the signals corresponding to different heights permit the ratio T sub e/T sub i to be determined and, where this is different from unity, the observed profile can then be corrected for the effect on the scattering introduced by the inequality in temperature. Results of observations extending over a period of one year from February 1963 to January 1964 are presented. The ratio T sub e/T sub i achieved a maximum value approximately 2.0 to 2.6 at a height of about 300 km soon after down, irrespective of the season. There was little change in height dependence in this ratio throughout the daylight hours, and at sunset the ratio fell with a time constant of the order of an hour. At night T sub e/T sub i was occasionally close to unity, but more often a significant difference remained in the temperatures at all heights. (Author)

AD-616 625 Div. 2/7
CFSTI Prices: HC$3.00 MF$0.75

McGill Univ., Montreal (Quebec). Stormy Weather Group.
TIME-DEPENDENT CHARACTERISTICS OF THE HETEROGENEOUS NUCLEATION OF ICE,
by Gabor Vali and E. J. Stansbury. Apr 65, 59p
Scientific rept. no. SR-4, MW-41
Contract AF19 628 249, Proj. 8620, Task 862004
AFCRL 65-340

Unclassified report

Descriptors: (*Ice, Nucleation), Time, Supercooling, Water, Freezing, Hail, Snow, Atmospheric precipitation, Temperature.

The dependence of heterogeneous nucleation of supercooled water drops on temperature and the duration of supercooling has been studied. The rain-sized drops were placed on an oiled aluminium surface and thermoelectric refrigeration was used to provide constant cooling-rates and to maintain constant temperatures. Once-distilled tap-water and melted snow and hail were investigated. Only the first two of these showed definite time-dependent properties. The experimental results are inconsistent with the hypothesis that all drops have equal probability of nucleation (stochastic hypothesis), and also with the hypothesis that the freezing temperature of a drop is the characteristic temperature of one of the impurities contained in the drop ("singular" hypothesis). The results can be explained if the existence of a variety of nuclei is recognized, each of which is most likely to cause nucleation in a different range of temperatures, and if the nucleation probability associated with each impurity is a function of the temperature of the sample. (Author)

AD-616 640 Div. 2/7
CFSTI Prices: HC$1.00 MF$0.50

Southwest Center for Advanced Studies, Dallas, Tex.
GEOMETRY OF THE MAGNETOSPHERIC TAIL AND AURORAL CURRENT SYSTEMS,
by Jules A. Fejer. May 65, 15p

Unclassified report

Letter to the Editor of the Journal of Geophysical Research.

Descriptors: (*Terrestrial magnetism, Geometry), Charged particles, Plasma physics, Plasma sheath, Solar wind, Aurorae, Atmospheric electricity, Magnetic fields, Upper atmosphere, Ionosphere.

Consequences of the measured magnetic field configuration are considered, and it is suggested that if the energetic charged particles in the neutral sheet were predominantly of one sign then this would result in ionospheric current systems and in important modifications of the co-rotation of low energy plasma in the magnetosphere.

AD-616 645 Div. 2/7
CFSTI Prices: HC$1.00 MF$0.50

Vitro Labs., Silver Springs, Md.
BALLOON INFLATION AND LAUNCHING DEVICE ML-594 (XE-3)/U.
Rept. no. 8 (final) 1 Jul 64-28 Feb 65,
by D. L. Mann and R. W. Kelly, Jr. 28 Feb 65, 14p
Contract DA28 043AMC00336E,
Proj. 1V025001A126 04 11

Unclassified report

Descriptors: (*Balloon equipment, Launching), Design, Portable, Meteorological balloons.

The final report summarizes the approach used to overcome problems associated with the operational and technical tasks assigned for the development of Balloon Inflation and Launching Device ML-594(XE-3)/U. The highlights for the development of a design plan are reviewed. Fabrication of service test devices is discussed for each major subassembly and the rationale of design selections is provided. Principal components that received detailed design description include the canopy, the canopy support, and clamps for securing leg and frame members. Other task assignments are summarized and documentation references are provided. These tasks include visualization data, spare parts list, operator's manual, technical instructions, spare manuals, test plan, environmental testing, compliance report, technical reports, and manufacturer's drawings. (Author)

AD-616 653 Div. 2/7
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A PRELIMINARY COMPUTATION OF PRESSURE AND TEMPERATURE BETWEEN 100 AND 800 KILOMETERS,
by W. Viezee. 18 Apr 60, 21p
Rept. no. P-1972

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Upper atmosphere, Density), Pressure, Temperature, Determination, Meteorological satellites, Sounding rockets.

Preliminary pressure and temperature data on the atmosphere between altitudes of 100 and 800 km are presented. Data on the density of the atmosphere taken from several sources serve as a basis for deriving mean pressure and temperature. The accuracy of the latter depends on the estimate of molecular weights of the gas mixture at high altitudes. Departures from this mean are caused by geophysical effects originating in solar emanations. (Author)

AD-616 656 Div. 2/7
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
GEOMAGNETIC CONTROL OF THE VAN ALLEN RADIATION BELTS,
by E. H. Vestine. 21 Apr 60, 21p
Rept. no. P-1977-NSF
Unclassified report

To be submitted to the Journal of Geophysical Research. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Van Allen radiation belt, Charged particles), Terrestrial magnetism, Sunspots, Electric fields, Atmospheric electricity, Ionosphere.

The integral invariants of charged-particle motion in the geomagnetic field discussed by Van Allen and others are evaluated. Calculations based on Finch and Leaton's coefficients for 1955.0 ('M. Nat. R. Astron. Soc.,' Geophysical Supplement, 7:314-317 (1957)) are used to describe the height and direction of longitudinal drift of the trapped radiation. The geomagnetic annual and sunspot variations are discussed in terms of the fields of drifting currents in the radiation belts. (Author)

AD-616 716 Div. 2/3, 2/7, 2/9
CFSTI Prices: HC$3.00 MF$0.75

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
AN INVESTIGATION OF THE OCEANIC EFFECTS ON THE CLIMATE OF PACIFIC EQUATORIAL SOUTH AMERICA.
Thesis,
by James D. Cook. 1965, 76p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Climatology, South America), (*South America, Climatology), (*Rainfall, South America), (*Ocean currents, Rainfall), Tropical regions, Mountains, Deserts, Seacoast, Barometric pressure, Meteorological charts, Harmonic analysis, Statistical analysis, Graphics.

The spatial and temporal distributions of rainfall for the equatorial latitudes on the Pacific coast of South America are described by graphical and statistical means. A relationship is established between the rainfall distributions and the offshore oceanic current regimes which is highly linear in nature. Anomalous rainfall years are then analyzed to determine a possible correlation with movements of the subtropical oceanic high pressure systems. The controversial question of the periodicity of rainfall anomalies is tested by harmonic analysis techniques. (Author)

AD-616 732 Div. 2/7, 2/1

Harvard Coll., Cambridge, Mass. Observatory.
THE STUDY OF METEOR PHENOMENA, UPPER ATMOSPHERE WINDS AND TURBULENCE AND CHEMILUMINESCENCE IN THE UPPER ATMOSPHERES.
Final rept.,
by Allan F. Cook, Richard E. McCrosky, and Fred L. Whipple. 31 Dec 64, 215p
Contract AF19 604 5196, Proj. 6694, Task 669407
AFCRL 65-33 Unclassified report
Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Upper atmosphere, Winds), (*Meteors, Orbital trajectories), Astronomical cameras, Astronomical data, Astrophysics, Celestial mechanics, Luminescence, Turbulence, Ablation, Radar reflections, Contamination, Saturn.

Seventeen meteoric trains were both photographed and reduced to determine winds in the upper atmosphere. Decay of luminosity has been studied for two trains. Orbits have been determined for 3044 meteors, 413 accurate, 2631 approximate. There is no evidence for hyperbolic orbits, only two meteors appear to have been produced by asteroidal particles, and there is every evidence that nearly all meteors originate from comets. Conclusions from other studies are that particles leave a meteoroid dark and subsequently ablate by vaporization, that the radar meteoric head echo can be caused by ultra-violet photoionization if oxygen has a sufficiently large dissociative recombination coefficient and that nitrogen and oxygen atoms near 108 km above sea level have a very non-uniform distribution. Other topics studied are the luminous efficiency of meteors, the spectra of meteors, and Saturn's rings. (Author)

AD-616 745 Div. 2/7
CFSTI Prices: HC$2.00 MF$0.50

Travelers Research Center, Inc., Hartford, Conn.
RELATIONSHIPS BETWEEN TROPICAL PRECIPITATION AND KINEMATIC CLOUD MODELS.
Rept. no. 7 (Final), for 1 May 62-31 Jan 65,
by Geirmundur Arnason and Edward A. Newburg.
Jun 65, 39p Rept. no. 7448-159
Contract DA36 039SC89099, Projs. 3A99 27 005, 1V0 14501B53A09 Unclassified report
See also PB-167 324.

Descriptors: (*Atmospheric precipitation, Tropical regions), (*Atmosphere models, Meteorological phenomena), Clouds, Dynamics, Convection.

A discussion of the work done with two kinematic models, both of which contain the bulk effects of microphysics of cloud and precipitation, is given. Of these two models, the first is one-dimensional and approximates conditions in the core of a precipitating cloud. The second model has a two-dimensional motion field and is therefore capable of a more realistic picture of cloud and precipitation development in a convective system. The effects of the most important cloud physics parameters upon cloud formation and precipitation rates are discussed. A brief account of work done with dynamic models including realistic thermodynamic processes, is given. Because this work is barely beyond its formulation and planning stages, the only result at hand is that of a perturbation pressure field associated with a small buoyant thermal bubble introduced at initial time. As expected, the pressure perturbation is essentially nonhydrostatic owing to the predominance of vertical accelerations. (Author)

AD-616 793 Div. 2/7

Air Force Cambridge Research Labs., Bedford, Mass.
SOLAR XUV RADIATION AND NEUTRAL PARTICLE DISTRIBUTION IN JULY 1963 THERMOSPHERE.
Environmental research papers,
by H. E. Hinteregger, L. A. Hall, and G. Schmidtke.
1964, 24p Rept. no. ERP-97
Proj. 6688, Task 668804
AFCRL 65-274 Unclassified report
Pub. in Space Research V, Proceedings of the

International Space Science Symposium (5th), Florence, May 8-20 1964
(Copies available only to DDC users).

Descriptors: (*Solar radiation, Upper atmosphere), (*Ultraviolet radiation, Solar radiation), (*Atmosphere, Solar radiation), Solar spectrum, Photochemistry, Ionization, Ions, Atmospheric sounding, Graphics, Geophysics.

Fluxes in 11 major groups and 91 subgroups of the solar spectrum from 1750 A to 1 A, together with cross sections of the major neutral atmospheric constituents, are tabulated and graphical data on the structure of the neutral atmosphere are presented as a semi-empirical working model of the thermosphere over New Mexico for late morning conditions, suggested as typical for most of July 1963, a month of essentially quiet solar conditions. The basis of these 'reference data' includes solar extreme ultraviolet radiation spectra from 1963 rockets and is weighted most heavily by extreme ultraviolet radiation absorption measurements of July 10, 1963, 10:00 a.m. in the 100-235 km region. Photoionization rates are presented graphically for (a) all primary photoions due to each of the major spectral groups, (b) the individual photoions (O+, N2+ and O2+ respectively) due to spectral ranges defined by the thresholds for various resulting ion states, (c) the individual photoions due to all radiation (1027 A to 1 A), and (d) estimated secondary ionization contributions due to the more energetic photons (370 A-1 A). Aeronomically defined needs for further extreme ultraviolet radiation measurements will be discussed. (Author)

AD-616 797 Div. 2/7, 2/5, 30/5, 20/1

Scripps Institution of Oceanography, Univ. of California, La Jolla.
IONIUM/THORIUM GEOCHRONOLOGY ON MIAMI CORE A 254-BR-C,
by Edward D. Goldberg, Minoru Koide, and John J. Griffin. 26 Dec 63, 12p
Contract Nonr221623, Proj. NR083 005
Unclassified report

Pub. in mono. Recent Researches in the Fields of Hydrosphere, Atmosphere and Nuclear Geochemistry, Tokyo, 1964 p117-26 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Caribbean Sea, Sedimentation), (*Sedimentation, Geologic age determination), (*Geologic age determination, Test methods), Thorium, Isotopes, Protactinium, Minerals.

Thorium-230 (ionium)/thorium-232 ratios from samples leached and from samples totally dissolved are compared for a Caribbean Sea sediment. The differences in the value of the ratio arise primarily from the introduction of thorium-232 in the detrital minerals to the preparate for radioactive assay. Similar ages for various levels of the core are obtained by either the ionium/thorium technique using leaching or by the ionium/protactinium method. (Author)

AD-616 808 Div. 2/7

Air Force Cambridge Research Labs., Bedford, Mass.
ANALYSIS OF IONOSPHERIC WINDS AND TURBULENCE OVER PUERTO RICO WITH A CORRELATION METHOD-I,
Environmental research papers,
by T. J. Keneshea, M. E. Gardner, and W. Pfister.
30 Jul 64, 30p Rept. nos. AFCRL65-273; ERP-100
Proj. 7663, Task 766304 Unclassified report

Pub. in Journal of Atmospheric and Terrestrial Physics v27 p7-30 1965
(Copies available only to DDC users).

Descriptors: (*Ionosphere, Wind), (*Atmospheric motion, Puerto Rico), Correlation techniques, Statistical functions, Drift.

Measurements of drift motions in the ionosphere have been made at Puerto Rico using the three spaced antenna technique. The fading records from this experiment were analyzed by a correlation method that assured the best overall fit to the data. This method which was based upon a modification of the Briggs, Phillips and Shinn technique made the data satisfy more closely the assumption of concentric correlation ellipsoids in the ground-time space. From a statistical analysis of the results, the drift direction and speed were obtained as well as the characteristic velocity, the orientation of the correlation ellipses in the ground plane, their ellipticity and size. The results indicate a steady wind toward the east during the summer and toward the west during the winter. The median drift speed is 75 m/sec during the day and 45 m/sec during the night. The correlation ellipses are strongly oriented around 240 degrees E of N. The same data were reduced by methods developed by Yerg, Harnischmacher and Wiewall all of which require less computer time than the method of best overall fit. Comparisons of these different methods were made. (Author)

AD-616 810 Div. 2/7, 30/5

Air Force Cambridge Research Labs., Bedford, Mass.
SATELLITE MEASUREMENTS OF THE DIURNAL VARIATION OF ELECTRON TEMPERATURES IN THE F REGION.
Environmental research papers,
by R. C. Sagalyn, M. Smiddy, and Y. N. Bhargava.
Apr 65, 25p Rept. nos. AFCRL 65-276; ERP-99
Proj. 8617, Task 861701
Unclassified report

Pub. in Space Research V, Proceedings of the Fifth International Space Science Symposium, Florence, May 8-20 1964
Abstract in English and Russian.
(Copies available only to DDC users).

Descriptors: (*Electron density, Diurnal variations), (*Diurnal variations, Electron density), (*Meteorological satellites, Ionosphere), Temperature, Electrons, Polar orbit trajectories.

Simultaneous measurements of electron temperatures and densities have been obtained in the F region with spherical electrostatic analyzers mounted on two Air Force satellites with polar, nearly circular orbits. Large diurnal variations of electron temperature are observed between 200 and 330 km. This is characterized by sharp increase in electron temperature of the order of 2000 degrees within two hours after ionospheric sunrise. At ground sunset a rapid decrease of electron temperature, T, commences. The rate of change of T is, however, an order of magnitude smaller than at sunrise. After ionospheric sunset, the temperature decrease with time is greatly reduced; a minimum of 1000 ± 200 K is measured before sunrise. Above 200 km, the rapid change in temperature at sunrise and sunset is accompanied by over an order of magnitude change in electron density. Below 200 km the amplitude of the diurnal variation of T decreases rapidly with altitude. Over the latitude range ± 75 degrees variations of temperature with local time are greater than the variations with latitude; however, there are observed small but significant increases in temperature and charge density in the southern hemisphere which are correlated with geomagnetic position. (Author)

AD-616 841 Div. 2/7, 2/6
CFSTI Prices: HC$2.00 MF$0.50

Kiruna Geophysical Observatory (Sweden).
AURORAL ZONE IONOSPHERIC RESEARCH.
Annual summary rept. for 1 Mar 64-28 Feb 65,
by Ludwik Liszka and Svante Westerlund. 24 Mar 65,
28p
Contract AF61 052 678
AFCRL 65-330
Unclassified report

See also AD-602 655.

Descriptors: (*Aurorae, Ionosphere), (*Ionosphere, Aurorae), Scientific satellites, Scintillation counters, Magneto-optic effect, Diffraction, Electrons, Polar regions, Diurnal variations, Terrestrial magnetism, Electromagnetic waves, Audiofrequency, Extra-terrestrial radio waves, Geophysics.

A large number of satellite records were investigated with emphasis on scintillation phenomenon and Faraday rotation. The scintillation-rate spectrum of satellite signals at 54 Mc/s observed at Kiruna was studied. Temporal variations in the scintillation-rate spectrum, in particular the occurrence of slow and fast scintillation was investigated. The height of scintillation-producing irregularities was studied. Measurements made at Kiruna were even compared with those made at Tromso, Norway. A new method for measuring of velocity of the diffraction pattern on the ground was also proposed. Irregularities of Faraday rotation were studied using satellite records made at seven European observatories. The correlation of the amplitude of the irregularities at different locations at the same time, and the correlation with other geophysical parameters was examined. Some new results on the horizontal gradients of electron content in the polar regions were obtained. The ionospheric electron content near the auroral zone was even investigated using differential Faraday observations of the multifrequency beacon satellite S-66 (1964-64A). Measurements made and results obtained during the last year are reported. Radiation in the range 5-55 c/s has no diurnal variation in January 1965. Polarisation measurements at 700 c/s show linear polarisation and a direction of the magnetic vector, which is almost constant. (Author)

AD-616 859 Div. 2/7

Defence Research Telecommunications Establishment, Ottawa (Ontario).
SOME IRREGULAR VARIATIONS OF THE ELECTRON DENSITY IN THE TOPSIDE OF THE IONOSPHERE.
Summary,
by G. L. Nelms and E. S. Warren. 1964, 3p
Unclassified report

Text in English and Russian.
Pub. in Space Research v5 p637-8 1964 (Copies available only to DDC users).
Proceedings of the International Space Science Symposium (no. 5), held at Florence, Italy, 8-20 May 64.

Descriptors: (*Ionosphere, Electron density), (*Electron density, Ionosphere), Ionospheric disturbances, Diurnal variations, Atmospheric sounding, Canada.

Distributions of electron number density between the peak of the F layer and 1000 km height, for the region between 80 N and 70 S latitude at about 75 W longitude, are presented for a variety of local times. From such distributions it is shown that: (1) Large scale irregularities are typical of the polar ionosphere at invariant magnetic latitudes greater than 70 at all times of day. (2) At low latitudes a diurnal change in the electron scale height at 800 km above ground is typical of the ionosphere at low latitudes; this is indicative of a diurnal change in the ionic composition of the F layer. The results are given of a study of the topside ionosphere during the geomagnetic storm of September 21, 1963. The behaviour of the maximum electron density of the F layer during the storm is compared with the behaviour for a quiet day period for a wide range of latitudes. During storms large deviations from mean values of electron density occur over the range of invariant latitudes from 25 to 70; during quiet days there occur only minor deviations in this region. (Author)

AD-616 890 Div. 2/7, 20/2
CFSTI Prices: HC$4.00 MF$0.75

Boeing Scientific Research Labs., Seattle, Wash.
NEUTRON FLUX MEASUREMENTS DURING JANUARY AND FEBRUARY 1964,
by Joleroy Gauger. Mar 65, 106p
Document no. D1-82-0417
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
Also available from the Author.

Descriptors: (*Cosmic rays, Neutron flux), (*Neutron flux, Cosmic rays), (*Atmospheric sounding, Neutron flux), Geophysics, South America, Aircraft, Radiation measuremeht systems, Nuclear physics, Graphics, Tables.

Data relating to the secondary cosmic ray rates measured at aircraft altitudes over an extended geophysical area are presented in detail. Data gathered on two flights (20 January 1964 and 12 February 1964) yielded determinations of the position of the cosmic ray equator along the 40 degrees N and 69 degrees W longitude lines at 1/2 degree ± 1N and 10 degrees ± 2S respectively. The experimental values compare favorably with the predictions of Shea and Smart. On 27 and 29 January 1964 extended range flights to 73 degrees S latitude provided data pertinent to an evaluation of the position of the south latitude polar plateau. An anomalous neutron flux increase on 21 January 1964 accompanied by an increase in night air glow intensity (5577 A) is related. The summed data over northern and southern hemispheres allow a comparison of several rigidity models. From the comparison it is apparent that the Makino treatment defines the latitude effects noted better than do the models of Quenby-Webber, Quenby-Wenk, or a rigidity model based on the McIlwain L parameter. (Author)

AD-616 896 Div. 2/7, 8/6
CFSTI Prices: HC$3.00 MF$0.75

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
AN INVESTIGATION OF THE NATURE AND EXTENT OF ATTENUATION OF 3.2-CM RADIATION BY SUB-TROPICAL PRECIPITATION.
Master's thesis,
by Robert W. Patton. Aug 65, 67p
Grant NSF G13834
Unclassified report

Research supported in part by U. S. Air Force.

Descriptors: (*Meteorological radar, Wave transmission), (*Radar interference, Atmospheric precipitation), (*Electromagnetic waves, Attenuation), (*Atmospheric precipitation, Radar interference),

Atmosphere, Gases, Clouds, Raindrops, Radar reflections, Radar echo areas, Superhigh frequency.

A quantitative study was made of the attenuation of 3.2-cm microwave energy by subtropical precipitation. Theoretical and practical aspects of the problem are considered. The empirical relationships between cloud and radar parameters are examined. Attenuation factors for 3.2-cm radiation are determined from data obtained from a dual-frequency radar system. Comparisons are made of the results obtained from the dual-frequency system with those from a single radar. (Author)

AD-616 910 Div. 2/7
CFSTI Prices: HC$6.00 MF$1.25

Chicago Univ., Ill.
MESOMETEOROLOGICAL FIELD STUDIES.
Final rept. for 1 May 60-31 Jan 65,
by Tetsuya Fujita, Kenneth A. Styber, Rodger A. Brown, Dorothy L. Bradbury, and Gisela L. Baralt.
Feb 65, 208p
Contract AF19 604 7259, Proj. 8620, Task 862002
AFCRL 65-220

Unclassified report

Rept. on Satellite and Mesometeorology Research Proj.

Descriptors: (*Meteorology, Arizona), Atmospheric precipitation, Convection, Cumulus clouds, Aerial photography, Atmospheric motion, Atmospheric sounding.

The initial purpose of the Mesometeorological Field Study was to conduct mesometeorological measurements in and around the San Francisco Peaks, Flagstaff, Arizona during July 1960 and July and August 1961. These measurements consisted of wind, microbarograph, temperature, rain and hail gauges, and other quantities required to determine the properties of the environment during cumulus activity. Data reduction and analysis was conducted at the University of Chicago subsequent to the field measurements. A theoretical study is presented in which a set of equations is proposed for the evaluation of the exchange coefficients which will apply to a convective cloud since those used near the ground are not applicable near the level of convective activity. A detailed case study is described in which the equations derived above are applied to a specific case of a developing cumulonimbus cloud. A photogrammetric study of the growth of a cumulonimbus cloud led to a model of three concentric cylinder-like regions, each larger one being more influenced by turbulent mixing with the environment than the next smaller one.

AD-616 926 Div. 2/7
CFSTI Prices: HC$2.00 MF$0.50

Center for Atmospheric and Space Physics, Univ. of Maryland, College Park.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF AURORA AND RELATED PHENOMENA.
Final rept. for 7 Mar 58-31 Dec 62,
by Richard T. Bettinger. Jun 65, 46p
Contract AF19 604 3861, Proj. 8605, Task 860504
AFCRL 65-368

Unclassified report

Descriptors: (*Aurorae, Atmospheric sounding), (*Microbarometric waves, Measurement), (*Atmospheric sounding, Microbarometric waves), (*Meteorological instruments, Atmospheric sounding), Solar wind, Shock waves, Sodium, Clouds, Upper atmosphere, Optical properties, Balloons.

An ultrasensitive microbarograph was developed for use in an experimental investigation of extraterrestrial shock waves incident on the lower atmosphere. These instruments have a full scale sensitivity of less than one dyne/sq cm and a frequency range from DC to approximately 10 cycles/sec. High altitude balloon flight tests indicate that these microbarograph perform properly; nevertheless, the experimental program had to be abandoned since the small osciallatory motions of the balloons at floating altitudes cause pressure fluctuation which were orders of magnitudes larger than those associated with the physical phenomenon under investigation (0.01 to 0.001 dynes/sq cm). Optical studies of an artificially induced sodium cloud in the upper atmosphere by means of a Fabry-Perot Interferometer were undertaken. The object of this investigation was to determine vertical temperature profiles from an observation of the Doppler broadening of the sodium D-lines. This effort was unsuccessful due to insufficient radiation intensity for the detector employed. (Author)

AD-617 049 Div. 2/7, 25/4

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
OPTICAL RADAR RESULTS AND IONOSPHERIC SPORADIC E.
Revised ed.,
by Giorgio Fiocco. 4 Feb 65, 3p
Contract DA36 039AMC03200E

Unclassified report

Pub. in Journal of Geophysical Research v70 n9 p2213-5 May 1 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 16 Dec 64.

Descriptors: (*Atmospheric sounding, Lasers), (*Lasers, Atmospheric sounding), Radar, Optical equipment, Optical scanning, Radar reflections, Meteors, Particles, Correlation techniques.

Correlations between optical radar echoes at heights between 110 and 140 km and ionospheric sporadic E are reported and interpreted as further evidence that the optical echoes were caused by extraterrestrial incoming particles and that E may at times be related to the same cause. (Author)

AD-617 060 Div. 2/7
CFSTI Prices: HC$1.00 MF$0.50

National Center for Atmospheric Research, Boulder, Colo.
DYNAMICS OF THE UPPER ATMOSPHERE.
Final rept.,
by Bernhard Haurwitz. 30 Apr 65, 21p
Contract AF19 628 3998, Proj. 8604, Task 860406
AFCRL 65-313

Unclassified report

Descriptors: (*Atmospheric tides, Moon), (*Moon, Atmospheric tides), Coriolis effect, Barometric pressure, Oscillation, Gravity, Surface area, North America, Central America, Geophysics.

The lunar tidal variation of the atmospheric pressure at the earth's surface has been determined at 6 stations in North America and Central America. The results confirm previous results about the response of the atmosphere to the lunar tidal force. An analysis of the 24-hourly solar pressure oscillation and its world-wide distribution shows that this oscillation with its irregular distribution and its smallness compared to the 12-hourly solar oscillation can be explained by the geographical distribution and magnitude of the corresponding temperature wave. The effect of the

earth's rotation on internal gravity waves is considered, and formulae are given to estimate quantitatively the effect of the Coriolis force and its variation with the latitude on these waves. (Author)

AD-617 065 Div. 2/7, 30/3
CFSTI Prices: HC$1.00 MF$0.50

Northeastern Univ., Boston, Mass.
DESIGN, CONSTRUCTION AND TESTING OF INSTRUMENTATION FOR THE INVESTIGATION OF THE ELECTRICAL STRUCTURE OF THE UPPER ATMOSPHERE.
Final rept. for 13 Jan 64-13 Jan 65,
by Robert D. Stuart. 13 Jan 65, 17p
Contract AF19 628 3875, Proj. 8617
AFCRL 65-176

Unclassified report

Descriptors: (*Atmospheric sounding, Instrumentation), (*Meteorological instruments, Atmospheric sounding), (*Upper atmosphere, Electrical properties), Sounding rockets, Scientific satellites, Data processing systems.

To further understand the physics of the upper-atmosphere, research program work has been carried out on the design, construction and testing of rocket and satellite instrumentation for the investigation of the electrical structure of the upper atmosphere. A description is given of a spherical sensor, and support instrumentation used on rockets and satellites to measure the positive and negative charged-particle densities. A description, in addition to typical results, is also given of some of the data-reduction procedures. (Author)

AD-617 083 Div. 2/7
CFSTI Prices: HC$1.00 MF$0.50

Geo-Science, Inc., Alamogordo, N. Mex.
RESEARCH ON AIRGLOW.
Final rept. for 1 Jan 61-31 Mar 65,
by June G. Jones and Mark W. Jones. 26 Apr 65, 25p
Contract AF19 604 7992, Proj. 8627, Task 862704
AFCRL 65-310

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Sky brightness, Scientific research), (*Photometers, Calibration), Night sky, Optical filters, Refraction, Data, Diurnal variations, Instrumentation, Spectrophotometers, Mexico, New Mexico, Argentina, Peru.

Observations of the night airglow were made at Sacramento Peak, New Mexico, at San Juan, Argentina, and at Tonantzintla, Mexico. The data of the night airglow, received from these stations as well as from Huancayo, Peru, were reduced and tabulated. Calibration techniques for the photometer are described. Special studies of airglow phenomena and special observations of the airglow emissions at twilight with the birefringent filter type photometer and with the night sky spectrograph are discussed. Work on the instrumentation is described. (Author)

AD-617 099 Div. 4/2
CFSTI Prices: HC$4.00 MF$1.00

Foreign Technology Div., Wright-Patterson AFB, Ohio.
CHEMISTRY OF PEROXIDE COMPOUNDS.
21 Apr 65, 124p FTD-TT-64-958
TT 65-62533

Unclassified report

Unedited rough draft trans. of mono. Khimiya Soedinenii Perekisi, Moscow 1963.
Available copy will not permit fully legible reproduction.

Descriptors: (*Oxidizers, Peroxides), (*Peroxides, Chemistry), Symposia, Classification, Hydrogen peroxides, Photochemistry, Thermochemistry, Phase studies, Lithium compounds, Barium compounds, Hydroxides, Calcium compounds, Strontium compounds, Rubidium compounds, Cesium compounds, Carbonates, Hydrates, Sodium compounds, Potassium compounds, Ozonides, USSR.

Contents: Classification and nomenclature of inorganic peroxide compounds, by I. I. Vol'nov; Photolysis of frozen solutions of hydrogen peroxide in water, by V. S. Gurman, V. I. Papisova, et al; Thermodynamics of certain process of hydrogen peroxide in aqueous solutions at various temperatures, by I. Ye. Flis, K. P. Mishchenko, et al; Concerning the existence of ternary compounds in the NH3-H2-H2O systems, by K. Ye. Mironov; Peroxide compounds of lithium and their synthesis, by T. A. Dobrynina and S. Z. Makarov; A method for obtaining barium peroxide from barium hydroxide, by L. A. Isarov; Oxidation of certain inorganic substances with peroxide compounds, by V. A. Lunenok,-Burmakina, A. P. Potemskaya and A. N. Gerasenkova; Production of peroxides of alkali earth metals: CaO2, SrO2, BaO2, by N. K. Grigor'yeva, T. I. Arnold and S. Z. Makarov; Investigation of peroxyhydrates and hydrates of rubidium and cesium carbonates, by B. S. Dzyatkevich and T. A. Dobrynina; Investigating the reaction process of carbon dioxide with akaline solutions of hydrogen peroxide and the synthesis of peroxocarbonates, by T. P. Firsova, A. N. Molodkina, et al; Reactions of sodium and potassium superoxides with water vapor and carbon dioxide and synthesis of peroxocarbonates, A. Kh. Mel'nikov, T. P. Firsova, et al.

AD-617 185 Div. 2/7
CFSTI Prices: HC$2.00 MF$0.50

Minnesota Univ., Minneapolis. School of Physics.
ATMOSPHERIC PHYSICS.
Annual progress rept.
May 65, 37p
Contract Nonr710 22

Unclassified report

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Descriptors: (*Atmosphere, Physics), Atmospheric motion, Weather forecasting, Dust, Balloons, Solar corona, Stratosphere.

Contents: Atmospheric motion; Stellar extinction measurements from balloons; Solar coronal experiments; Structure of the lower stratosphere; Optical radar probe; Atmospheric dust.

AD-617 218 Div. 2/7

Iowa State Univ., Iowa City.
MORPHOLOGY OF THE OUTER ZONE ELECTRON DISTRIBUTION AT LOW ALTITUDES FROM JANUARY THROUGH JULY AND SEPTEMBER 1963 FROM INJUN 3,
by T. Armstrong. 10 Feb 65, 35p

Contract Nonr150906

Unclassified report

Pub. in Journal of Geophysical Research v70 n9 p2077-110 May 1 1965(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electron density, Upper atmosphere), (*Periodic variations, Electron density), Meteorological satellites, Magnetic storms, Terrestrial magnetism, Diurnal variations, Geophysics, Scientific satellites.

An intensive study has been made of data from three 213 GM tubes and one 302 GM tube that were carried on the State University of Iowa-Office of Naval Research satellite Injun 3. Median-latitude profiles of the electron population of the low-altitude region of the outer zone for energies E>40 kev, E>230 kev, and E>1.6 Mev have been derived. Notable features of the median profiles are: (1) the large diurnal variation for L > 7.5 for trapped and precipitated 40-kev electrons; (2) the lack of a sharply pronounced 'slot' for 40-kev electrons and the consequent softening of the integral electron spectrum around L = 3.0; (3) an apparent small diurnal variation of 230-kev trapped electrons for 6 < L < 8; (4) a temporal change of about one order of magnitude in the intensity profile of 1.6-Mev electrons, which preceded and was followed by periods of relatively stable intensity for 2 < L < 4.5. This change occurred during a K = 7 magnetic storm that began on June 6, 1963. The dependence of intensity on absolute value of B was investigated with the following results: (1) For specified L values in the range 2 < L < 7.5 there is an apparent decrease in intensity of 40- and 230-kev electrons of about two to three orders of magnitude for absolute value of B going from =0.2 to =0.5 gauss. (2) The intensity of 1.6-Mev electrons also decreases about two orders of magnitude with absolute value of B going from =0.2 to =0.5 gauss, and for 2 < L < 4.5 the decrease in intensity due to the magnetic storm on June 6 is clearly evident. (Author)

05. Behavioral and Social Sciences

AD-616 455 Div. 28/4

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
DETERMINANTS OF RELIABILITY IN PERSONALITY RATINGS,
by E. K. Eric Gunderson. 1965, 6p
Proj. MR005 12 2004, Task 1
Unclassified report

Pub. in Journal of Clinical Psychology v21 n2 p164-9 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Personality, Psychometrics), Projective techniques, Reliability, Effectiveness, Adjustment(Psychology), Correlation techniques, Analysis of variance, Professional personnel, Polar regions, Selection.

Thirty-five clinician teams rated approximately 700 volunteers for Antarctic service on a set of personality traits and global adjustment predictions. The effects of variations in professional experience and idiosyncracies of clinicians' rating patterns upon inter-rater reliabilities were determined. Similarity of professional experience favorability of ratings, deviation from modal rating profiles, and agreement on the relevance of personality traits for the assignment were found to be related to interrater agreement. However, a fuller understanding of clinician agreement would appear to depend upon investigation of trait meanings and processes of cue selection, evaluation, and combination. (Author)

AD-616 461 Div. 28/4, 32/3

Georgia Univ., Athens.
PUBLICATION TRENDS IN HUMAN LEARNING: 1940-1964,
by Clyde E. Noble. 24 Mar 65, 2p
Contract Nonr367702
Unclassified report

Pub. in Perceptual and Motor Skills v20 p959-60 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Learning, Documentation), (*Documentation, Learning), Retention, Transfer of training, Reports, Subject indexing.

Numbers of publications on human learning over the past 25 years were found to be increasing relatively as well as absolutely in seven major U. S. journals. (Author)

AD-616 494 Div. 28/1, 16/1

Langley Porter Neuropsychiatric Inst., San Francisco, Calif.
INFLUENCES OF RESPIRATORY CYCLE ON SIMPLE REACTION TIME,
by Monte Buchsbaum and Enoch Callaway. 9 Mar 65, 6p
Contract Nonr293100; Grant CDMH62 1 33
Unclassified report

Pub. in Perceptual and Motor Skills v20 p961-6 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Respiration, Motor reactions), Reaction-(Psychology), Reflexes, Auditory signals, Electrocardiography, Pulse rate, Central nervous system, Psychophysiology.

The effect of respiration on simple auditory reaction time was studied. In the first study, reaction times and respiratory phase data were collected during spontaneous breathing; in Study 2, a warning light signaled S to hold his breath in either inspiration or expiration. Both experiments showed faster reaction times with expiration. This is contradictory to reaction time findings reported by other investigators who have studied effects of respiration. (Author)

AD-616 511 Div. 32/8, 18/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
COMMUNIST CHINA AND NUCLEAR WARFARE,
by Alice Langley Hsieh. 1 Feb 60, 21p
Rept. no. P-1894 Unclassified report

Descriptors: (*Nuclear warfare, China), (*China, Nuclear warfare), (*Political science, China), Strategic warfare, Communism, Government(Foreign), Nuclear weapons, Attitudes, Decision making.

The Chinese Communists, on coming to power, were confronted with a set of strategic problems totally new to them. No longer a mobile force operating from the countryside, they were after 1949 in control of cities, and were rapidly developing a vested interest in industrial complexes, communication centers, and transportation facilities. Although the Korean War awakened them to the importance of modernized, regular forces, the problem of decision-making in the field of military affairs was exacerbated and complicated by the revolution in weaponry and strategic thinking that had occurred outside China in the very period during which the Chinese Communists were gaining and consolidating their power. The report explores the nature of the Chinese response to this revolution in weaponry and strategic thinking; the divisive effect that a growing appreciation of the implications of nuclear warfare had on Chinese military circles and on relations between the Party and the Army; and the significance of the evolving Chinese attitudes for the Sino-Soviet strategic relationship.

AD-616 531 Div. 32/9, 32/8, 32/4

American Univ., Washington, D. C. Foreign Area Studies Div.
U. S. ARMY AREA HANDBOOK FOR INDONESIA.
Sep 64, 732p
DA Pam-550-39 Unclassified report
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, as D101.22:550-39, HC$2.50.
Available from CFSTI, MF$3.25.

Descriptors: (*Indonesia, Handbooks), (*Social sciences, Indonesia), Sociology, Political science, Economics, Culture, Education, Language, Religion, Labor, Industries, Commerce, Army.

The book is one of a series of country handbooks designed for use by persons who have need for such background information. The emphasis is on objective description of contemporary national institutions. Treatment is intended to be comprehensive rather than exhaustive. The studies are introductory, and it is expected that the reader will have recourse to many other sources for more detailed information in areas of special interest. Extensive bibliographies are included for this purpose.

AD-616 544 Div. 23/4, 28/5
CFSTI Prices: HC$3.00 MF$0.75

Bio-Dynamics, Inc., Cambridge, Mass.

DESIGN AND USE OF INFORMATION SYSTEMS FOR AUTOMATED ON-THE-JOB TRAINING. VOLUME III. EXPERIMENTAL USE OF THREE INSTRUCTIONAL CONCEPTS,
by Thomas B. Sheridan. Mar 65, 84p
Contract AF19 628 455, Proj. 7682, Task 768204
ESD TDR-64-234 V3
Unclassified report

See also AD-602 041, AD-602 042.

Descriptors: (*Training devices, Command + control systems), (*Command + control systems, Training devices), Design, Automation, Teaching machines, Computers, Behavior, Game theory, Performance-(Human), Performance tests, Display systems, Control panels, Errors, Decision making, Human engineering, Air force personnel.

The report describes three experiments in which novel teaching concepts were demonstrated. These concepts had been proposed in previous reports but their effectiveness remained to be verified experimentally. The results were: (1) A teaching program ordered according to the discovery principle significantly reduced errors and performance time over that observed after training with a conventional training manual. (2) Slides projected directly onto a control console, together with a taped lecture, were found to be an effective method of presenting an automated training program. (3) Graphical logical flow diagrams were found to be efficient instructions for teaching procedures for performing a querying-reasoning task. It was concluded that these concepts should be exploited in training programs for operators of Air Force Information Systems. (Author)

AD-616 545 Div. 23/4, 28/5
CFSTI Prices: HC$1.00 MF$0.50

Bio-Dynamics, Inc., Cambridge, Mass.
DESIGN AND USE OF INFORMATION SYSTEMS FOR AUTOMATED ON-THE-JOB TRAINING, VOLUME V.
Final rept. for 1962-1964,
by Thomas B. Sheridan. Apr 65, 22p
Contract AF19 628 455, Proj. 7682, Task 768204
ESD TDR-64-234 V5
See also AD-616 551. Unclassified report

Descriptors: (*Command + control systems, Training devices), (*Training devices, Command + control systems), Design, Models(Simulations), Computers, Automation, Programming(Computers), Decision making, Display systems, Teaching machines.

The report describes the results and conclusions of a study which was directed at the development of principles for the design of automated instructional subsystems for Information Systems. A series of four Technical Documentary Reports have been issued which describe in detail the activities and results of each aspect of the study. This report brings together and summarizes the results reported in the individual documents, and includes additional items which did not warrant separate documentation. (Author)

AD-616 551 Div. 23/4, 28/5
CFSTI Prices: HC$2.00 MF$0.50

Bio-Dynamics, Inc., Cambridge, Mass.
DESIGN AND USE OF INFORMATION SYSTEMS FOR AUTOMATED ON-THE-JOB TRAINING. VOLUME IV. GRAPHICAL SYMBOLOGY AND LOGIC DIAGRAMS FOR USE AS TRAINING AIDS,
by Benjamin C. Duggar, Ronald C. Rosenberg, Thomas B. Sheridan, and Sylvia R. Mayer. Jan 65, 43p
Contract AF19 628 455, Proj. 7682, Task 768204
ESD TDR-64-234 V4
Unclassified report

See also AD-616 544.

Descriptors: (*Command + control systems, Training devices), (*Training devices, Graphics), Computers, Programming(Computers), Computer logic, Language, Behavior, Decision making, Instruction manuals, Control panels, Teaching machines.

The report describes the results of a study to develop a graphical symbology and logic diagraming technique for use as a training aid. This work is addressed to the need for a language which describes the logical relationships among task components and the interactions between man and machine in advanced computer-based information systems. Symbols and a logic diagraming technique were developed and refined by utilization with several different types of tasks. This 'language' has been found to be useful for the following purposes: (a) to supplement written instruction manuals, (b) as an instructional tool without text, and (c) as a performance aid when displayed directly on an operational console. A step-by-step methodology for constructing logic flow diagrams is presented, and applications are discussed. (Author)

AD-616 552 Div. 28/5, 28/1, 32/2
CFSTI Prices: HC$1.00 MF$0.50

Arizona State Univ., Tempe.
PSYCHOLOGICAL PROCESSES IN LANGUAGE COMMUNICATION.
Final rept.,
by Arthur Staats. Jun 65, 6p
Contract Nonr279402, Proj. NR154 179
Unclassified report

Descriptors: (*Social communication, Learning), (*Language, Social communication), Word association, Conditioned reflex, Verbal behavior, Bibliographies.

A list is given of reports and respective published references accomplished under the contract for research on psychological processes in language communication.

AD-616 553 Div. 28/1
CFSTI Prices: HC$3.00 MF$0.75

Arizona State Univ., Tempe.
AN INTEGRATED-FUNCTIONAL LEARNING APPROACH TO COMPLEX HUMAN BEHAVIOR,
by Arthur Staats. Jun 65, 98p
Technical rept. no. TR-28
Contract Nonr279402, Proj. NR154 179
Unclassified report

This paper will also be published as part of the Annual Carnegie Institute of Technology Symposium on Cognition (1st).

Descriptors: (*Learning, Conditioned reflex), (*Conditioned reflex, Verbal behavior), (*Behavior, Conditioned reflex), Word association, Motor reactions, Social communication, Emotions, Reasoning, Reading, Theory.

It is suggested that to present an adequate learning theory of human behavior, it is necessary to integrate classical and operant conditioning principles as well as to elaborate the ways in which these principles function to produce complex S-R mechanisms. When this is done

the resulting theory has the potential complexity and flexibility that is demonstrated in complex human behavior, including the possibility of accounting for original or novel behavior. The latter is crucially important to an adequate account of human cognitive behavior and general cultural advancement.

AD-616 558 Div. 32/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
LINGUISTIC RESEARCH AT THE RAND CORPORATION,
by David G. Hays. 2 Feb 60, 22p
Rept. no. P-1900
Unclassified report

Descriptors: (*Language, Analysis), (*Machine translation, Data processing systems), Automatic indexing, Abstracting, Information retrieval, USSR.

This paper describes postediting rules for description of function in context, work on computational routines for semi-automatic analysis, the concept of idiom-in-structure, and two broad problems on which work is just beginning at RAND: grammatic transformation and distributional semantics. The latter problems are especially important for automatic indexing, abstracting, and text searching. (Author)

AD-616 560 Div. 32/4
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
DIFFERENCES BETWEEN THE PERSONAL DEMAND FOR MONEY AND THE BUSINESS DEMAND FOR MONEY,
by John J. McCall. 8 Feb 60, 36p
Rept. no. P-1905
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Economics, Banking), (*Banking, Money), (*Commerce, Banking), Theory, Mathematical analysis, Distribution(Economics), Costs, Statistical analysis, Tables.

The theoretical framework concerning the differences between the personal and the business demand for money is developed. Four standard hypotheses are introduced and the theory is restated in terms of demand deposits and debits to demand deposits. Some of the implications of the economic theory are mentioned, and a problem of data collection is discussed. Estimates of business turnover and personal turnover are obtained for banks in the Seventh Federal Reserve District where business turnover was found to be significantly greater than personal turnover. An analysis of data which the Federal Reserve Bank of Chicago collected from a bank in Kankakee, Illinois is presented. The main conclusions of the analysis are (1) that the synchronization of debits and credits in the business sector is superior to synchronization in the personal sector; (2) that the person is more uncertain about his average transactions over a period of time than is the business firm; (3) that because of (1) and (2) business turnover is greater than personal turnover; and (4) that while personal debits and personal deposits are unrelated, there is a significant positive relation between business debits and business deposits, i.e., business turnover is more stable than personal turnover.

AD-616 563 Div. 32/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
GLOSSARY LOOKUP MADE EASY,
by H. S. Kelly and T. W. Ziehe. 29 Feb 60, 16p
Rept. no. P-1909
Unclassified report

Descriptors: (*Dictionaries, Digital computers), (*Digital computers, Dictionaries), Machine translation.

Most of the work on the dictionary problem for machine translation has consisted of attempts to reduce the amount of information involved, thus bringing the problem within the capabilities of presently available or soon-to-be-available computing equipment. This paper presents a technique for handling the problem with currently available computing equipment and without the complexities of information compression. In essence, the approach is to compile a glossary of forms from the current text and then to retrieve information about each from the dictionary as the information is needed in the translation process. (Author)

AD-616 564 Div. 32/2, 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
GROUPING AND DEPENDENCY THEORIES,
by David G. Hays. 16 Feb 60, 13p Unclassified report
Rept. no. P-1910
Descriptors: (*Groups(Mathematics), Topology), (*Topology, Groups(Mathematics)), (*Language, Topology), Machine translation, Vocabulary, Set theory.

Immediate-constituent analysis and dependency analysis (two theories of syntactic description) are based, respectively, on the topologies of grouping and of trees. A correspondence between structures of the two types is defined, and the two topologies are compared, mainly in terms of their empirical applications. (Author)

AD-616 568 Div. 32/3
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SOVIET SCIENTIFIC AND TECHNICAL LITERATURE: SOURCES AND AVAILABILITY,
by Rosemary Neiswender. 23 Feb 60, 19p
Rept. no. P-1919
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Indexes, Scientific research), (*Scientific research, USSR), (*USSR, Indexes), Documentation, Information retrieval, Reports, Reviews, Periodicals, Abstracting, Bibliographies.

AD-616 574 Div. 32/8, 18/7
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SOVIET STRATEGIC IDEAS, JANUARY 1960,
by H. S. Dinerstein. 4 Mar 60, 32p
Rept. no. P-1925 Unclassified report

Available copy will not permit fully legible reproduction Reproduction will be made if requested by users of DDC Copy is available for public sale.

Descriptors: (*Political science, USSR), (*Foreign policy, USSR), (*Strategic warfare, USSR), Armed forces(Foreign), Disarmament, Nuclear warfare, Defense systems, Deterrence, Propaganda, Public opinion, Arms control, Cold war.

An analysis is given of a speech made by Khrushchev to the Supreme Soviet on January 14, 1960, and of two speeches by Malinovskii, one made to the Supreme Soviet on the same date and one to a military group in Moscow on January 19. Quotations in the report are from the author's translations of the Soviet newspaper reports of these speeches.

AD-616 575 Div. 32/2, 30/2, 32/11
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MIMIC: A TRANSLATOR FOR ENGLISH CODING,
by H. S. Kelly. 7 Mar 60, 17p
Rept. no. P-1926
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC Copy is available for public sale.

Descriptors: (*Language, Programming(Computers)), (*Programming(Computers), Language), Coding, Compilers, Machine translation, Dictionaries, Classification, Analysis, Speech.

The paper describes an automatic coding system developed to provide rapid implementation, testing, and modification of computer routines for linguistic research. A Translator analyzes and translates English-like statements into a pseudo-code program. An Interpreter subsequently executes the program. The system is being used to program rules for insertion and inflection in a Russian-English translation routine. (Author)

AD-616 581 Div. 32/4, 20/8
CFSTI PRICES: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE PEACEFUL ATOM IN RETROSPECT AND PROSPECT,
by Arnold Kramish. 8 Mar 60, 13p
Rept. no. P-1938
Unclassified report

An address based on a study of 'U. S. Foreign Policy and the Peaceful Atom' for the Council on Foreign Relations, New York, and presented at a luncheon for Cincinnati business leaders.

Descriptors: (*Economics, Nuclear industrial applications), (*Nuclear industrial applications, Economics), Nuclear power plants, Electric power production, Power supplies, Costs, Fuels, Oils, Coal, Foreign policy.

AD-616 583 Div. 32/2, 32/4
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MACHINE TRANSLATION OF RUSSIAN PREPOSITIONS,
by K. E. Harper. 19 May 60, 27p
Rept. no. P-1941 Unclassified report

Descriptors: (*Machine translation, Analysis), Dictionaries, Physics.

In the development of a program for Russian-English machine translation a substantial amount of information was generated relative to the translation of Russian prepositions. Empirical studies, based on approximately 240,000 running words of Russian physics texts, reveal the extent of this translation problem in these texts. The contextual determinants of the translation of prepositions were studied: for each occurrence of a multivalent preposition the syntactically related items (dependent and governor) were machine listed. The effect of these items on the translation of the preposition is summarized. (Author)

AD-616 587 Div. 32/8, 20/7
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE CHINESE PEOPLE'S REPUBLIC AND THE BOMB,
by Arnold Kramish. 23 Mar 60, 8p
Rept. no. P-1950
Unclassified report

Descriptors: (*Nuclear bombs, China), (*China, Nuclear bombs), Nuclear reactors, Uranium, Plutonium, Reactor fuels, USSR, Foreign policy.

AD-616 589 Div. 32/8
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SINKIANG AND SINO-SOVIET RELATIONS,
by A. S. Whiting. 4 Apr 60, 21p Rept. no. P-1953
Unclassified report

Descriptors: (*Foreign policy, USSR), (*Political science, China), Communism, History, Economics, Industrial production, Culture, Population, Foreign aid.

AD-616 591 Div. 32/8
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
'Nth COUNTRIES' AND DISARMAMENT,
by F. C. Ikle. 1 Apr 60, 17p Rept. no. P-1956
Unclassified report

Descriptors: (*Arms control, Nuclear weapons), (*Nuclear weapons, Disarmament), Political science, Government(Foreign), Nuclear bombs, Nuclear warfare.

Arguments and counter-arguments are presented with regard to the possibility of more and more countries acquiring nuclear weapons--the 'Nth Country' problem. Arms control and the cooperation of the major powers in the enforcement of an arms control agreement are suggested as possible solutions to the problem.

AD-616 619 Div. 32/8
CFSTI Prices: HC$4.00 MF$1.00

Georgetown Univ., Washington, D. C.
THE ROLE OF THE MILITARY IN GOVERNMENT IN CHILE, 1924-1925.
Master's thesis,
by Richard George Toye. Feb 65, 144p
Unclassified report

Research supported in part by Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Chile, Political science), (*Political science, Chile), Government(Foreign), Armed forces (Foreign), Economics, Industrial production, Labor, Social sciences, Commerce, Costs, Leadership.

Contents:
Backgrounds of Revolution
Political and social background
Military background
Pre-revolutionary Alessandri era
Role of the Military from September 1924 to January 1925
Role of the Military in the Events of 1925: Revolt of January; Return of Alessandri; New Constitution.

AD-616 622 Div. 28/3, 16/12, 16/1, 16/5
CFSTI Prices: HC$4.00 MF$0.75

Kansas State Univ., Manhattan.
SYMPOSIUM ON THE ROLE OF MACROMOLECULES IN COMPLEX BEHAVIOR HELD AT KANSAS STATE UNIVERSITY ON APRIL 20-22, 1964.
Final rept.,
by John Gaito. 1964, 107p Unclassified report
Grant Nonr G00060 64

Descriptors: (*Behavior, Biochemistry), (*Memory, Biochemistry), (*Learning, Biochemistry), (*Nucleic acids, Nervous system), (*Nervous system, Nucleic acids), Cells(Biology), Nerve cells, Excitation, Bionics, Communication theory, Antigens + antibodies, Immunology, Brain, Ribonucleic acids, Symposia.

Contents:
A cellular approach to adaptive processes in the nervous system, by M. B. Sporn and W. Dingman
A chemically specified molecular mechanism underlying excitation in nerve: a hypothesis, by J. M. Tobias
Macromolecular conformation changes as possible information processing mechanisms, by L. Augenstein and J. Van Zytveld
Antibody formation and immunological memory, by N. K. Jerne
A critical appraisal of the role of RNA in information storage in the nervous system, by S. H. Appel
Nucleic acids and brain function, by J. Gaito
RNA and memory, by J. V. McConnell
The molecular biology of memory - summary, by J. Bonner
Some notes on the structure of memory, by K. H. Pribram.

AD-616 624 Div. 16/12
CFSTI Prices: HC$2.00 MF$0.50

Mental Research Inst., Palo Alto, Calif.
SELECTED BIBLIOGRAPHY FOR THE MILITARY PSYCHIATRIST,
by Arlene Kaplan Daniels and Dorothy Earley Weitzman. May 65, 41p
Contract DA40 193MD2396
Unclassified report

Prepared in cooperation with Wisconsin Univ., Madison.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Psychiatry, Bibliographies), (*Bibliographies, Psychiatry), (*Military personnel, Psychiatry), Military psychology, Professional personnel, Medical personnel, Army, Scientific research.

This bibliography contains references for the following topics: (1) The Professional in Modern Western Society, (2) The Medical Profession, (3) The Psychiatrist, (4) The General Exigencies of the Military Setting for Professional Practitioners of Various Kinds, 5) Problems for the Psychiatrist in the Army, (6) Descriptions of Special Contexts within which the Military Psychiatrists May Work -- And Descriptions of the Duties Entailed, (7) The 'Field' and the General Hospital in the Army, (8) Ideological Explanations and Resolutions for Professional Difficulties Facing Army Psychiatrists, 9) Military Psychiatrists Face Problems in Diagnosis, Classification and Description, (10) Types of Research Engaged in by Military Psychiatrists and Members of the Military Psychiatry Team, (11) Relevant Bibliographies. (Author)

AD-616 632 Div. 28/1
CFSTI Prices: HC$1.00 MF$0.50

Delaware Univ., Newark. Center for Research on Social Behavior.
PREFERENCE FOR INFORMATION ABOUT AN UNCERTAIN BUT UNAVOIDABLE OUTCOME,
by John T. Lanzetta and James M. Driscoll.
1 Jun 65, 23p Technical rept. no. TR-1
Contracts AF49 638 1441, Nonr228504,
Proj. MR005.12-2005.01
Unclassified report

Descriptors: (*Decision making, Tests), Motivation, Reaction(Psychology), Conditioned reflex, Galvanic skin response, Behavior, Sequential analysis, Stress (Psychology), Learning.

(Predictive strategies and the need to confirm them: some notes on pathological types of decision. 'Psychological Reports,' 15:99-105 (1964)). The study was designed to examine the effects on search of type of outcome (whether positive or negative), and to monitor the affective state of subjects in an attempt to clarify the basis for overtly non-instrumental search behavior. The study had three objectives: (a) to extend to the human level the analysis of the effects of uncertain and unavoidable outcomes on information search where, to date, only Pervin's paired comparison preference data are available; (b) to assess the differential effects of type of outcome (shock, monetary reward) on search; and in particular (c) to measure possible changes in the affective or arousal state of subjects in response to information. (Author)

AD-616 652 Div. 32/4

RAND Corp., Santa Monica, Calif.
A NOTE ON STABILITY, AND THE BEHAVIOR ASSUMPTIONS OF HARROD-TYPE MODELS,
by Richard R. Nelson. 20 Apr 60, 24p
Rept. no. P-1971
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Economics, Mathematical models), Stability, Perturbation theory.

AD-616 657 Div. 32/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
GOVERNORS OF THE CONJUNCTION YTO,
by J. H. Pustula. 22 Feb 60, 16p Rept. no. P-1978
PB 166 175 Unclassified report
Available copy will not permit fully legible reproduction.

Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Language, USSR), Physics, Analysis, Dictionaries, Vocabulary.

The Russian subordinate conjunction YTO = that introduces noun clauses. This paper lists all of the words and idioms that have been found to govern YTO-clauses in the RAND corpora of Russian physics text. (Author)

AD-616 661 Div. 32/2, 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
BASIC PRINCIPLES AND TECHNICAL VARIATIONS IN SENTENCE-STRUCTURE DETERMINATION,
by D. G. Hays. 9 May 60, 21p
Rept. no. P-1984
Unclassified report

Rept. prepared for the London Symposium on Information Theory (4th), Aug 60.

Descriptors: (*Language, Analysis), Data processing systems, Computers, Programming(Computers), Machine translation, Classification.

Comparison of alternative methods of sentence-structure determination can take one method as a base and show the changes required to convert it into another. Basic principles of the RAND method include (i) isolation of grammatic detail from the structure of the computer program and (ii) postulation of a certain word-order rule. Technical variations in the order of establishment of connections and the procedure used for testing agreement could make the RAND method more similar to others now in use, and might improve its accuracy. Restructuring and the use of context are noted as additional types of variation. (Author)

AD-616 663 Div. 32/8
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
WHY ARE THE CHINESE NERVOUS.
Revised ed.,
by A. M. Halpern. 5 Jul 60, 33p
Rept. no. P-1987
Unclassified report

Revision of rept. dated 11 May 60.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Political science, China), (*China, Foreign policy), Communists, Government(Foreign), Cold war, Disarmament, Deterrence, Public opinion, Social communication, Newspapers, United States Government, USSR.

The paper describes the development by Chinese Communist leaders, between October 1, 1959, and April 1, 1960, of an analysis of and a declared policy concerning the current international situation, with particular reference to the prospects for peaceful co-existence. Chinese Communist conditional acceptance of a role in disarmament negotiations is analyzed in this context. Areas of difference between the Soviet and Chinese Communist positions are identified and an estimate is made of their significance. (Author)

AD-616 673 Div. 32/4

RAND Corp., Santa Monica, Calif.
SECURITY OF SUPPLY AND ENERGY POLICY IN WESTERN EUROPE,
by Harold Lubell. 20 May 60, 37p
Rept. no. P-1998
Unclassified report

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Descriptors: (*Economics, Fuel consumption), (*Western Europe, Fuel consumption), (*Fuel consumption, Western Europe), Fuels, Coal, Oils, Gases, Gasoline, Costs, Industries, Industrial production, Energy, Energy conversion.

Conclusion: The switch to oil in the countries which initially industrialized themselves on an energy base of coal is world-wide, and both the United States (where the trend has been set for some time) and the USSR (where the latest plans for energy production call for a rapid development of oil and gas rather than coal) are held up as models for the future pattern of energy consumption in Western Europe. What is overlooked is the obvious fact that both the United States and the USSR have a choice among energy sources available within their borders and directly under their own control. Western Europe does not have the same choice.

AD-616 674 Div. 23/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON UNIVERSITY COURSES IN MATERIALS FOR THE ENGINEER,
by William R. Micks. 8 Jun 60, 13p
Rept. no. P-1999
Unclassified report

Prepared for presentation at the Annual Meeting of the American Society for Engineering Education (68th) at Purdue University, June 20 to 24, 1960.

Descriptors: (*Materials, Education), (*Education, Materials), Engineering personnel, Universities, Effectiveness.

The courses should concentrate on the engineering methods and on fundamentals to the exclusion of demands for the specialization.

AD-616 702 Div. 32/8
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NEW POWER STRUGGLE IN THE KREMLIN: WHO'S ON TOP.
by Vernon V. Aspaturian. Jun 65, 16p
Rept. no. P-3155
Unclassified report

Descriptors: (*Political science, USSR), (*USSR, Political science), Communists, Leadership, Government(Foreign).

AD-616 704 Div. 23/1
CFSTI Prices: HC$1.00 MF$0.50

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.

A MARKOVIAN MODEL FOR PROJECTING MOVEMENTS OF PERSONNEL THROUGH A SYSTEM,
by John W. Merck. Mar 65, 21p PRL-TR-65-6
Proj. 7719, Task 771901
Unclassified report

Descriptors: (*Personnel management, Mathematical models), (*Management control systems, Personnel), Computers, Mathematical prediction, Probability, Iterative methods, Operations research, Stochastic processes.

A computer-processed mathematical model is developed which simulates movements of personnel through the system, with the movements based on empirically derived probabilities, the transition rates. Significant variables are selected-such as career field, length of service, promotion rate-that distribute the system members in a vector of states upon which a probability matrix operates to produce the estimated distribution of personnel at the end of the next time interval-say a year. By iteration, the model can provide estimates for any number of years in the future. Proposed policy changes (e.g., accelerated promotions) can be entered into the system to forecast their effects. In establishing a model, the basic decision is the selection of variables that will characterize the members. The first requirement is that reliable input data be available for the current and preceding time intervals. (Author)

AD-616 711 Div. 28/2, 29/1, 29/2, 29/3, 29/4, 29/5, 29/6, 18/3
CFSTI Prices: HC$2.00 MF$0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
A STUDY OF THE RELATIONSHIP BETWEEN MILITARY EQUIPMENT DESIGN AND OPERATOR EFFICIENCY,
by John F. Christian. 15 Dec 60, 37p
Unclassified report

A Secretary of the Army's Research and Study Fellowship Report.

Descriptors: (*Human engineering, Army equipment), (*Army equipment, Human engineering), Logistics, Design, Industrial equipment, History, Sanitary engineering, Fire extinguishers, Performance(Human), Psychology.

It was found that the relationship between product appearance and operator efficiency, expressed as 'function,' exists on a subjective level as a Gestalt and can be best satisfied by industrial design. Appearance factors cannot be thought of as individual 'bits' with discrete meanings which can be applied to build a more complex meaning. Work in determining criteria of acceptance by the Quartermaster Corps could provide a foundation both for a study of the psychophysical effects of appearance factors and for evaluating experimental configuration designs, the results of which would provide guidance for the industrial designer. A more comprehensive type of industrial design, with a background in aesthetics, economics, sociology, psychology and engineering, provides an excellent combination for optimizing the design of military equipment.

AD-616 717 Div. 30/1
CFSTI Prices: HC$7.00 MF$1.75

Army Research Office, Durham, N. C.
RESEARCH IN PROGRESS, DURING CALENDAR YEAR 1964 UNDER THE AUSPICES OF THE U. S. ARMY RESEARCH OFFICE, DURHAM.
1965, 313p Unclassified report

Descriptors: (*Scientific research, Army research), (*Army research, Scientific research), Physics, Chemistry, Mathematics, Engineering, Metallurgy, Ceramic materials, Indexes, Abstracting, Reports.

AD-616 726 Div. 30/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
TESTING, ANALYSIS, AND DECISION MAKING,
by Freeman A. Tatum. Apr 65, 23p
Rept. no. P-3107
Unclassified report

Descriptors: (*Weapon systems, Tests), (*Air Force, Decision making), (*Decision making, Tests), (*Research program administration, Air Force), Weapons, Armed forces procurement, Analysis, Operations research, Management planning, Costs, Effectiveness, Air force operations.

The role of testing in support of Air Force decision problems is reviewed as a background for considering some implications of this role on testing. The principal Air Force decision problems are discussed in terms of three categories: (1) research and development decisions; (2) force structure decisions, and (3) operational planning decisions.

AD-616 728 Div. 30/1, 18/1
CFSTI Prices: HC$3.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE RAND CORPORATION; THE FIRST FIFTEEN YEARS.
Nov 63, 51p
Unclassified report

Descriptors: (*National defense, Scientific organizations), (*Scientific organizations, Operations research), (*Operations research, Air Force), Research program administration, History, Air Defense Command, Nuclear weapons, Satellites(Artificial), Meteorology, Logistics, Economics, Costs, Engineering, Computers, Medicine, Mathematics, Political science, Systems engineering, Game theory, Symposia.

AD-616 731 Div. 23/4
CFSTI Prices: HC$1.00 MF$0.50

Personnel Research Lab. (6570th) Aerospace Medical Div., Lackland AFB, Tex.
USE OF HIGH SCHOOL RECORD INFORMATION IN PREDICTING SUCCESS IN ELECTRONICS TRAINING,
by Chester J. Judy. Mar 65, 16p
PRL-TR-65-5
Proj. 7719, Task 771906
Unclassified report

Descriptors: (*Air force personnel, Electronic technicians), (*Electronic technicians, Selection), Education, Training, Aptitude tests, Mathematical prediction, Performance(Human).

High school record information (along with test information) was used to predict technical school performance of 433 airmen completing Air Force courses for which a score of 80 on the Electronics Aptitude Index was recommended. It was found that presently used information on the completion of five nigh school courses is useful in adding to the prediction of a technical school grade criterion, and that information on other high school courses improves

this prediction significantly. A further increase in the predictive utility of high school record information can be realized if level-of-performance information on certain high school courses is added to completion data on those same courses. (Author)

AD-616 749 Div. 28/5, 23/2, 28/2
CFSTI Prices: HC$3.00 MF$0.75

Pittsburgh Univ., Pa.
EFFECTS ON THE SUBSEQUENT PERFORMANCE OF NEGOTIATORS OF STUDYING ISSUES OR PLANNING STRATEGIES ALONE OR IN GROUPS,
by Bernard M. Bass. Jun 65, 53p
Technical rept. no. TR-6
Contract Nonr62414
Unclassified report

Part of the first experiment of the three described in this rept. was presented earlier in Technical rept. no. 1.

Descriptors: (*Industrial relations, Bargaining), (*Bargaining, Industrial relations), (*Group dynamics, Bargaining), Management planning, Labor unions, Performance(Human), Emotions, Reasoning, Behavior, Game theory, Analysis of variance, Industrial psychology, Sociometrics.

In three successive experiments, as representatives of management or labor, 256 graduate business students bargained individually with counterparts on nine issues. Two of the four treatments of each experiment required groups of Ss to plan strategies or to study the issues with considering bargaining tactics. Various kinds of prenegotiation study groups were contrasted. Also, some Ss strategized or studied alone rather than in groups. In the first and third experiments in which deadlines were imposed, those negotiators who had prepared themselves by planning strategies were more likely to deadlock, more so if they had planned in advance in groups rather than alone. Detailed analyses are presented of the effects of the treatments within each experiment on specific contract outcomes, the overall favorability to the company of the settlements, the departure of the agreements reached from community norms and the speed of settlement. The latter two outcomes (departure and speed) were highly correlated. A variety of treatment effects appeared, some of which were consistent across experiments. Also, agreement of each two negotiators on the relative importance of issues depended on prenegotiation treatment as did the judged importance of most of the nine issues and the post-settlement evaluation of the adequacy of the settlement reached. (Author)

AD-616 750 Div. 28/5
CFSTI Prices: HC$1.00 MF$0.50

Pittsburgh Univ., Pa.
PERSONAL BACKGROUND AND INTERGROUP COMPETITIVENESS,
by Bernard M. Bass. Jun 65, 15p
Technical rept. no. TR-7
Contract Nonr62414
Unclassified report

Descriptors: (*Group dynamics, Attitudes), Behavior, Personality, Students, Education, Sociometrics.

Nine quasi-T groups met in one of three intergroup competitions. Trios of T group representatives then discussed and evaluated the three competing essays produced by their respective T groups. Engineering graduates were most prone to overevaluate their own essay's technical adequacy. Business graduates were most likely to overevaluate their own group product's financial merit, and liberal arts college grades were most likely to overevaluate the human relations portion of their own group's essay. Liberal arts students generally were less competitive, regardless of the area they evaluated. (Author)

AD-616 753 Div. 23/4, 8/2, 19/3
CFSTI Prices: HC$3.00 MF$0.50

Human Resources Research Office, George Washington Univ., Alexandria, Va.
APPLICATION AND TEST OF THE FORECASE CONCEPT OF ELECTRONICS MAINTENANCE ON NAVY LORAN EQUIPMENT.
Technical rept.,
by Edgar L. Shriver and Robert C. Trexler. May 65, 52p Rept. no. TR-65-3
Contract DA44 188AR02, Proj. 2J024701A712 01
Unclassified report

Descriptors: (*Electronic equipment, Maintenance), (*Loran equipment, Maintenance), (*Maintenance, Electronic equipment), (*Training, Maintenance personnel), (*Electronic technicians, Training), Training devices, Effectiveness, Naval equipment, Naval personnel.

The report describes the Technical Advisory Service rendered to the Navy in connection with the Task FORECAST concept of electronics maintenance. This concept is presented as a collection of policies, methods, techniques, and services integrated in a plan for improved level of electronics maintenance in the services. Special reference is made to the application of the FORECAST concept to the Navy LORAN system and to the resulting products and level of performance achieved. In implementing FORECAST procedures, Navy chief petty officers, working with FORECAST scientists, produced a technical manual and training program, using an especially designed device and programmed instruction. The same tests in identifying malfunctions in LORAN systems were given to 86 Navy electronics technicians, FORECAST trained, and to 12 graduates of a conventional Navy course. FORECAST students identified 39% of the bad parts; conventionally trained students, 13%. (Author)

AD-616 765 Div. 28/5, 1/4
CFSTI Prices: HC$1.00 MF$0.50

Bunker-Ramo Corp., Canoga Park, Calif.
HUMAN ENGINEERING SUPPORT: PILOT FACTORS PROGRAM.
Final summary rept. for 1 Mar-22 May 65.
21 May 65, 21p
Contract AF33 615 2214
Unclassified report

Continuation of Contract AF33 616 7752, see also AD-612 726.

Descriptors: (*Instrument flight, Human engineering), (*Human engineering, Pilots), (*Aircraft landings, All-weather aviation), (*Flight control systems, Aircraft landings), Guidance, Display systems, Automatic, Programming(Computers), Data processing systems, Landings, Training planes.

The report covers the four general activity areas. These areas are characterized by a common plan of approach: (1) technical direction and furnishing of project equipments by the Flight Control Division; (2) installations and maintenance of project equipment by the Lear-Siegler engineering support group; (3) development of instrument flying procedures and inflight conduct of studies by the Instrument Evaluation Section; and (4) development of measurement techniques, data collection, reduction, and analysis by the Bunker-Ramo support group. Each of the four areas is discussed as an entity, with the problems and progress of the individual area placed in context. The appendices contain chronological accounts of: presentations to members of the interested flying community, including demonstration flights in PI-FAX aircraft. (Author)

AD-616 770 Div. 32/8, 18/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
PIETIES, ARMS POLICY, AND THE SCIENTIST-POLITICIAN. (A REVIEW OF JEROME WIESNER'S 'WHERE SCIENCE AND POLITICS MEET'),
by James R. Schlesinger. May 65, 11p
Rept. no. P-3140 Unclassified report

Descriptors: (*Arms control, Reviews), (*Scientific research, Political science), Scientific personnel.

The most important paper is the last. Its co-author is Dr. Herbert York. Wiesner has long felt that thorough-going disarmament is unobtainable for the present and the immediate objective should be to obtain stable mutual deterrence through arms limitation. Earlier in the section he argues that 200 hardened and dispersed missiles on each side would provide adequate deterrents. The Wiesner-York piece amplified the case for stable mutual deterrence, but with the added twist that present weapons technology prospects make it improbable that anything else can be obtained. It is suggested that due to vulnerability considerations, the best protection is provided by large numbers of missiles. The argument is cast in terms of the missile duel calculations fashionable in the late fifties in which a single missile cannot destroy more than one enemy missile -- and a missile force only a smaller number of enemy missiles. The argument against big bombs is thus surreptitiously transformed into one contending that developing or deploying large-payload missiles would be militarily unproductive. Men like Drs. Wiesner and York, who have held high public office, have a special obligation imposed upon them scrupulously to avoid misinforming the public. But in this presentation they are open to the charge of having misrepresented the technical data so as to leave the impression that weapon development is now more or less static and militarily marginal. Quite regrettably this is just not so. (Extracted)

AD-616 785 Div. 16/15, 28/3, 25/1
CFSTI Prices: HC$3.00 MF$0.75

Defense Research Lab., Univ. of Texas, Austin.
MASKING AND BINAURAL PHENOMENA.
Summary rept. (Acoustical),
by Lloyd A. Jeffress. 14 Jun 65, 88p
Rept. no. DRL-A-245
Contracts NObsr72627, NObsr93124, Proj. NR142 190
Unclassified report

Descriptors: (*Hearing, Theory), (*Noise, Auditory perception), Thresholds(Physiology), Auditory nerve, Auditory signals, Statistical distributions, Vector analysis.

Recent work on the subject of masking is summarized, particularly the masking of tonal signals by Gaussian noise. Various theories of masking and of auditory function are discussed with considerable emphasis on the theory of signal detectability. The vector theory of binaural unmasking is presented, with some discussion of the possible underlying neurophysiological machinery.

AD-616 787 Div. 32/4, 15/1
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Los Angeles. Western Management Science Inst.
THE ECONOMICS OF UNCERTAINTY, XI AND XII.
Working paper,
by Karl Borch. Apr 65, 34p Rept. no. WP-76
Contract Nonr23375, Proj. NR047 041
Unclassified report

See also AD-612 356, -612 730, -612 731, -613 671, and -613 672.

Descriptors: (*Economics Probability), (*Commerce, Game theory), (*Game theory, Commerce), Gain, Operations research, Money, Mathematical models, Costs, Numerical methods and procedures.

The paper first gives a short survey of the different objectives which a firm can pursue when it operates under uncertainty. It is then assumed that survival is the prime objective of the firm, and various implications of this assumption are investigated. (Author)

AD-616 821 Div. 28/1

Michigan Univ., Ann Arbor.
RELATIONSHIP BETWEEN WORD FREQUENCY AND RECOGNITION: PERCEPTUAL PROCESS OR RESPONSE BIAS,
by Robert B. Zajonc and B. Nieuwenhuyse. 13 May 63, 11p
Grant AF AFOSR21 63, Proj. 9778, Task 977803
AFOSR 65-0712
Unclassified report

Pub. in Journal of Experimental Psychology v67 n3 p276-85 Mar 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Visual perception, Motivation), (*Reaction(Psychology), Language), Brightness, Training.

Functions relating word frequency to recognition threshold and to pseudo-recognition threshold were compared for 24 Dutch Ss. Luminance thresholds were obtained to 10 Turkish words previously shown with frequencies of 1, 2, 5, 10, and 25. Pseudo-recognition thresholds were obtained in the absence of stimuli for the same words and the same Ss. Drive was manipulated to determine whether it interacts with frequency, taking this interaction as an indication of response bias. The comparison of the frequency-threshold functions, the absence of a drive-frequency interaction, and the decreasing dependence of response emission on prior training with increasing stimulus information, demonstrated that response bias plays a negligible role in the frequency-recognition relationship when stimuli are present and when a stringent recognition criterion is employed. (Author)

AD-616 825 Div. 28/3, 16/12

New York State Univ., Brooklyn. Downstate Medical Center.
RECENT ADVANCES IN BIOLOGICAL PSYCHIATRY: PERCEPTUAL MODE AND PAVLOVIAN TYPOLOGY,
by P. Hein, S. Cohen, and B. M. Shmavonian.
1964, 9p
Grants AF AFOSR57 64, PHS GM05385
Unclassified report

Pub. in The Proceedings of the Annual Convention and Scientific Program of the Society of Biological Psychiatry (19th) v7 chap9 p 71-8 ed. by Joseph Wortis, Los Angeles, Calif. 1-3 May 64.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Psychophysiology, Conditioned reflex), (*Conditioned reflex, Personality), (*Personality, Conditioned reflex), Sensory perception, Vision, Adaptation(Physiology), Autonomic nervous system, Light, Galvanic skin response, Electroencephalography.

Eleven field-dependent and 11 field-independent subjects were compared in an autonomic conditioning design using one reinforced and four nonreinforced colored lights. The GSR data presented here indicate that the field-independent group demonstrate more responsiveness and 'activation' as well as greater differentiation in their specific responses to the reinforced when compared to the nonreinforced lights. (Author)

AD-616 834 Div. 30/1
CFSTI Prices: HC$1.00 MF$0.50

Air Force Office of Scientific Research, Washington, D. C.
THE R AND D ORGANIZATION'S FUNDAMENTAL RESEARCH ACTIVITY AS A WIDOW BETWEEN SCIENCE AND TECHNOLOGY,
by William J. Price. 21 Apr 64, 14p
AFOSR 65-0864
Unclassified report

Speech presented to the Institute on Research Administration (9th), American Univ., Washington, D. C., 20-24 Apr 64.

Descriptors: (*Scientific research, Research program administration), (*Research program administration, Scientific research), Laboratories.

The fundamental research activities of an R and D organization are presented as important both for providing specific research results in areas of potential pay-off for the organization and in providing a window between science and technology. The need and potential for the latter activity are inherent in the recognition that a very large portion of the scientific research on which a given technology depends is always done by other organizations. The discussion deals primarily with the opportunities and techniques for providing this window. (Author)

AD-616 843 Div. 32/4
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Los Angeles.
ECONOMIC DEVELOPMENT THEORIES AND BUSINESS FIRM STRATEGIES,
by J. Fred Weston and Arnold Reisman. May 65, 32p Working paper no. WP-75
Contract Nonr23373, Proj. NR047 003
Unclassified report

Supported in part by the Western Management Science Institute under a grant from the Ford Foundation.

Descriptors: (*Economics, Commerce), (*Commerce, Economics), Population, Wages, Industries, Industrial production, Agriculture, Money, Tables.

The paper seeks to provide the broad parameters for analyzing the characteristics of nations as they move through phases of economic development. Patterns of characteristics are analyzed to provide a basis for simulation of economic processes for countries at different degrees of development. The characteristic economic patterns also provide a basis for business firms to plan their policies for investment and other international business activities in relation to opportunities in different kinds of environments. (Author)

AD-616 844 Div. 30/1, 32/3
CFSTI Prices: HC$5.00 MF$1.25

RAND Corp., Santa Monica, Calif.
SELECTED RAND ABSTRACTS, VOLUME 2, 1964. ABSTRACTS 986-1805.
1964, 195p
Unclassified report

Descriptors: (*Air force research, Abstracting), (*Scientific research, Abstracting), (*Abstracting, Air force research), Subject indexing, Systems engineering, Economics, Foreign policy, Strategic warfare, Defense systems, Air Force, Reports.

Contents:
Science, technology and methodology;
Systems applications;
Economics and foreign affairs;
Defense policy and strategy;
General and miscellaneous.

AD-616 845 Div. 32/2, 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE USE OF MACHINES IN THE CONSTRUCTION OF A GRAMMAR AND COMPUTER PROGRAM FOR STRUCTURAL ANALYSIS,
by K. E. Harper and D. G. Hays. 9 Jan 59, 15p
Rept. no. P-1588
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Machine translation, Language), (*Language, USSR), Analysis, Digital computers, Programming(Computers), Punched cards.

The paper describes progress made on the building of a descriptive grammar of Russian with the complementary efforts of linguists and digital computers. The method of research is described, emphasizing the analysis by which the work of human translators is converted into a program of computer instructions. A computer program for sentence-structure determination is outlined; this program is considered the key to accurate machine-translation. (Author)

AD-616 846 Div. 32/2, 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ORDER OF SUBJECT AND OBJECT IN SCIENTIFIC RUSSIAN WHEN OTHER DIFFERENTIA ARE LACKING,
by D. G. Hays. 11 Mar 59, 8p Rept. no. P-1632
Unclassified report

Descriptors: (*Machine translation, Language), (*Language, USSR), Analysis, Punched cards.

Conclusions: On the basis of a preliminary study of the 56 relevant instances in 22,000 running words of text, it was concluded that if two nouns in a sentence cannot be distinguished as subject and object of a transitive verb by their morphological properties, and if one precedes the verb while the other follows, the first noun is the subject. This rule, together with adequate coverage of idioms, appears entirely effective. (Author)

AD-616 847 Div. 32/11
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
STUDIES IN MACHINE TRANSLATION, 8: MANUAL FOR POSTEDITING RUSSIAN TEXT.
Revised ed.,
by K. E. Harper, D. G. Hays, and B. J. Scott. 7 Nov 59, 38p Rept. no. P-1624
Unclassified report

See also PB-166 864.

Descriptors: (*Machine translation, Documentation), (*Documentation, Machine translation), Language, Coding, USSR.

The present study is a practical guide to editors who refine partially machine-translated text as a basis for linguistic analysis. The posteditors' tasks are: to code

preferred English equivalents, to code English structural symbols, to resolve grammatic properties, and to code syntactic connections (dependencies). A general introduction to the field of machine translation is contained in RM-2060.

AD-616 876 Div. 23/5
CFSTI Prices: HC$2.00 MF$0.50

Naval Personnel Research Activity, San Diego, Calif.
TRAINING UNDERSTANDING OF RELATIVE MOTION: I, AN EXPERIMENTAL EVALUATION OF SPATIAL REFERENCE SYSTEMS USED IN THE SOLUTION OF NAVAL MANEUVERING PROBLEMS.
Final rept.,
by Daniel N. Braunstein, Eugene A. Hooprich, and Edward A. Rundquist. Mar 65, 38p
Technical bull. no. TB-65-4
Proj. 3 1703 02 02 1S2
Unclassified report

Descriptors: (*Naval training, Armed forces maneuvers), (*Armed forces maneuvers, Naval training), Aptitude tests, Performance tests, Space perception, Maneuverability, Effectiveness, Decision making, Analysis of variance, Retention, Ships, Training, Students.

Three groups of college students were trained to solve relative motion problems on the maneuvering board. The only difference between the training given to each group was the spatial reference system taught for change of station problems. One group used a system based on placing the guide ship of the formation in the center of the board, another placed their own ship in the center, while the third group alternated between the first two systems. The findings of this study do not encourage the teaching of both systems simultaneously. High aptitude college students did solve problems faster using guide ship in the center, apparently because less confusing mechanics are involved. However, there is no assurance that with further practice, this difference would not disappear. A general conclusion is that teaching subjects to solve maneuvering problems presented in written form by methods which approximate those in current use does not produce any evidence that real understanding is being achieved.

AD-616 877 Div. 23/5
CFSTI Prices: HC$2.00 MF$0.50

Naval Personnel Research Activity, San Diego, Calif.
TRAINING UNDERSTANDING OF RELATIVE MOTION: II, ANALYSIS OF ERRORS MADE IN SOLVING NAVAL MANEUVERING PROBLEMS.
Final rept.,
by Eugene A. Hooprich and Daniel N. Braunstein.
Mar 65, 44p Technical bull. no. TB-65-6
Proj. 3 1703 02 02 2S2
Unclassified report

See also AD-616 876.

Descriptors: (*Naval training, Armed forces maneuvers), (*Armed forces maneuvers, Naval training), Errors, Plotting boards, Analysis of variance, Ships, Performance tests, Training, Students.

As part of a series of studies concerning training in the solution of naval maneuvering problems, an analysis was made of errors committed by college students while solving change-of-station problems. One approach was a detailed classification of errors made on a final examination; another consisted of five short tests of the separate problem solution steps. Plotting, especially in the context of actual problems, was the major source of errors. There also were a large number of errors related to the use of the logarithmic time, speed, and distance scale. Measuring errors were relatively infrequent. Although the data are not completely consistent, there is an indication that the use of the guide as the reference ship for solving change-of-station problems is less prone to several types of errors than is the use of own ship. (Author)

AD-616 878 Div. 23/5, 18/7, 15/1
CFSTI Prices: HC$1.00 MF$0.50

Naval Personnel Research Activity, San Diego, Calif.
EFFECT OF PRACTICE ON DECISION-MAKING IN SIMPLE GAMES WITH SIMPLE STRATEGIES.
Final rept.,
by William H. Payne. Mar 65, 17p
Technical bull. no. TB-65-7
Proj. 3 1703 05 03 2S2 Unclassified report

Descriptors: (*Game theory, Decision making), (*Naval training, Decision making), (*Decision making, Game theory), Strategic warfare, Analysis of variance, Transfer of training, Students, Learning, Performance-(Human), Matrix algebra, Effectiveness.

A preliminary experiment to evaluate the effectiveness of practice on the ability of personnel to make decisions in simple zero-sum two-person gaming situations was conducted with college students as subjects. Four decision problems were used in the experiment. The Ss played against each other in pairs; each S attempted to maximize accumulation of points. It was found that the Ss were able to learn through practice alone to approximate minimax solutions to the problems. With this simple situation no significant transfer from problem to problem was found; thus, there was no indication that learning on one problem had any marked effect on learning another problem. Large differences between problems were found, indicating the presumably obvious fact that the subjects' ability to make correct decisions depends on the difficulty of the decision problem. Further study is needed to determine the reason for the lack of transfer. (Author)

AD-616 879 Div. 23/5, 18/7, 15/1
CFSTI Prices: HC$1.00 MF$0.50

Naval Personnel Research Activity, San Diego, Calif.
THE EFFECT OF IRRELEVANT INFORMATION ON DECISION MAKING IN SIMPLE GAMES WITH SIMPLE STRATEGIES.
Final rept.,
by William H. Payne. Mar 65, 15p
Technical bull. no. TB-65-8
Proj. 3 1703 05 03 2S2 Unclassified report

Descriptors: (*Game theory, Decision making), (*Decision making, Game theory), (*Naval training, Decision making), Optimization, Strategic warfare, Analysis of variance, Matrix algebra, Students, Effectiveness.

A simple experiment using 5x5 two-person zero-sum games was conducted to determine the effect of multiplying a constant to each value of a payoff matrix. Four different constants were multiplied to a single simple game. Multiplication of the payoff matrix caused the decision maker to be given irrevelant information about the game since the optimum strategy for the game did not depend upon this constant. Eight San Diego State College students served as subjects for this experiment. The subjects played in pairs each making 200 decisions on each side of every game. It was concluded that multiplying a game by a constant does not influence the subject's decisions. (Author)

AD-616 880 Div. 23/4, 23/1, 30/2
CFSTI Prices: HC$1.00 MF$0.50

Naval Personnel Research Activity, San Diego, Calif.

AN EXPERIMENTAL COMPARISON OF INSTRUCTIONAL TECHNIQUES FOR USE IN TEACHING COMPUTER PROGRAM FLOW CHART DESIGN.
Final rept.,
by John K. Meyer. Mar 65, 22p
Technical bull. no. TB-65-10
Proj. 3 1703 02 03 1S2

Unclassified report

Descriptors: (*Training, Programming(Computers)), (*Programming(Computers), Training), (*Computer personnel, Selection), Aptitude tests, Design, Naval personnel, Education, Students, Psychometrics.

Four small groups of college students, selected to approximate a group who had been found to have difficulty in succeeding in the Navy basic course in computer programing, were taught flow charting for computer programing purposes by two methods and two lengths of practice. The only significant differences found concerned the influences of aptitude as measured by the mathematics tests from the Navy Officer Classification Battery and by programer aptitude tests. It is tentatively concluded that selection is a more important problem in training programers than methods of training. Objective methods were developed for grading the final examination flow chart exercise. Plans include developing and simplifying this grading procedure for use with other designs. (Author)

AD-616 881 Div. 28/5
CFSTI Prices: HC$1.00 MF$0.50

Human Engineering Labs., Aberdeen Proving Ground, Md.
CHECK-READING ACCURACY AS A FUNCTION OF DIAL ALIGNMENT IN AN EXTENDED-POINTER DIAL DISPLAY.
Technical memo.,
by Lynn C. Oatman. Feb 65, 19p
Rept. no. TM-2-65

Unclassified report

Descriptors: (*Human engineering, Display systems), (*Display systems, Human engineering), Effectiveness, Design, Performance tests, Applied psychology, Analysis of variance, Errors, Visual perception.

Two simulated dial displays were compared in a check-reading task. The pointers were aligned at 12 o'clock in one display and at 9 o'clock in the other. The dial displays were presented to 30 subjects who were asked to indicate whether the display contained a deviant pointer and, if so, to locate it. The data indicate that subjects performed about equally well with the two pointer alignments. Locations of the deviant dials within the displays were an important determinant of the number of deviant pointers detected. (Author)

AD-616 882 Div. 28/5
CFSTI Prices: HC$1.00 MF$0.50

Human Engineering Labs., Aberdeen Proving Ground, Md.
CHECK-READING ACCURACY: ALIGNED DIALS vs. EXTENDED-POINTER DIALS.
Technical memo.,
by Lynn C. Oatman. May 65, 21p
Rept. no. TM-6-65

Unclassified report

Descriptors: (*Human engineering, Display systems), (*Display systems, Human engineering), Visual perception, Design, Performance tests, Analysis of variance, Applied psychology, Errors, Configuration.

Two simulated dial displays were compared in a check-reading task. An extended-pointer dial display was compared with an aligned dial display. The two dial displays were presented to 30 subjects who were asked to indicate whether or not the display contained a deviant pointer, and, if so, to locate the deviant pointer. The data indicated that subjects performed about equally well with the extended-pointer dial display and the aligned dial display. However, the location of the deviant dial within the display was an important determinant of the number of deviant pointers detected. (Author)

AD-616 883 Div. 32/3, 30/2, 8/7
CFSTI Prices: HC$4.00 MF$1.00

Air Force Office of Scientific Research, Washington, D. C.
INFORMATION SCIENCES, 1964,
by Harold Wooster. Mar 65, 127p
Rept. no. AFOSR 65-0271

Unclassified report

See also AD-600 110.

Descriptors: (*Documentation, Scientific research), (*Information retrieval, Scientific research), Classification, Language, Computers, Communication theory, Programming languages, Artificial intelligence.

This book is a report on the research program sponsored by the Directorate of Information Sciences of the Air Force Office of Scientific Research during 1964. The research program is divided into six tasks: information systems research; information extraction and classification, transmission of information; adaptive and self-organizing systems; language and linguistic research; and theoretical foundations.

AD-616 889 Div. 32/3, 4/1, 4/2, 4/3, 4/4
CFSTI Prices: HC$3.00 MF$0.75

Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
USER REQUIREMENTS FOR CHEMICAL INFORMATION AND DATA SYSTEM (CIDS).
Final rept.,
by Charlotte Smith. Apr 65, 67p
Rept. no. R-1755
Proj. 2P023201A720

Unclassified report

Descriptors: (*Chemistry, Information retrieval), (*Information retrieval, Chemistry), Army, United States Government, Documentation, Abstracting, Periodicals, Data.

Eighty-two users of chemical information from seventeen Army installations were surveyed to determine their information requirements. Their present methods for conducting retrospective bibliographic searches and searches for specific facts and data were explored. Tools and techniques used to maintain current awareness were recorded, and information services were discussed. Preferred formats and desired response times for requests for references and chemical data, tolerance for 'noise' and overlooked relevant material, and traffic were determined. An analysis of 308 examples of questions asked by users of chemical information is included. This survey was conducted as one phase of the work involved in the design of an Army Chemical Information and Data System (CIDS). (Author)

AD-616 913 Div. 30/1, 5/2, 8/1, 8/6, 25/6, 30/2
CFSTI Prices: HC$4.00 MF$0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
ELECTRON AND SOLID STATE PHYSICS, AUTOMATIC CONTROL, COMMUNICATIONS AND NETWORKS, AND ELECTROMAGNETIC RADIATION.
Semiannual progress rept. no. 69, 1 Jul 64-1 Jan 65.

30 Mar 65, 102p
Contracts Nonr186607, Nonr186616
Unclassified report

Descriptors: (*Physics, Scientific research), (*Control, Scientific research), (*Communication theory, Scientific research), (*Electromatic waves, Scientific research), Electrons, Solid state physics, Control systems, Networks, Automatic, Ferromagnetic materials, Microwave equipment, Wave transmission.

AD-616 915 Div. 23/4
CFSTI Prices: HC$3.00 MF$0.75

American Inst. for Research., Palo Alto, Calif.
SHAPING FASTER QUESTION ANSWERING.
Technical rept.,
by Lloyd O. Brooks. Jun 65, 74p
Rept. nos. TR-10, AIR-C28-6/65-TR10
Contract Nonr307700
Unclassified report

Descriptors: (*Education, Teaching machines), (*Teaching machines, Education), Learning, Tests, Students, Performance(Human), Reading, Decision making, Errors, Correlation techniques, Tables.

In laboratory experiments, conducted with 12 college student Ss who completed programed lessons at a teaching machine during twice-per-week sessions, Ss were automatically scored separately for correctness and for speed of correct answering; their points were later of monetary value to Ss who continued for the month of experimentation. Ss operated the lettered key corresponding to the first letter of the last word of their answer. Read-and-answer times, obtained in a previous study, were considered in establishing circuits for scoring the speed of each correct answer in relation to individual frames of material. Answers scored as fast were followed by circuit changes which allowed proportionately less time for a next correct response to be scored as fast. Typically, failures to obtain scores relaxed scoring standards. Scoring for speed occurred during half of each of the two (at least) lesson presentations, according to a counterbalanced design. Cumulative records indicated Ss' gross performance, correct answers, speed scores, and equipment function. Printing-counter records indicated each read-and answer time in seconds. The last 10 of these times during the experimental treatment (scoring for speed) were subtracted from the last 10 during control to obtain criterion measures. To a statistically reliable degree, Ss who were instructed in the basis for scores answered questions faster during the scored-for-speed portion of lessons, particularly characteristically slower Ss during initial presentations of lessons which began with relaxed scoring standards and reset to these following a failure. (Author)

AD-616 965 Div. 28/1

Aviation Psychology Lab., Univ. of Illinois, Urbana.
SPATIAL AND TEMPORAL UNCERTAINTY AS DETERMINANTS OF VIGILANCE BEHAVIOR,
by Jack A. Adams and Lawrence R. Boulter.
2 Mar 63, 6p
Contract AF19 604 5705
ESD TDR-63-125
Unclassified report

Pub. in Journal of Experimental Psychology v67 n2 p127-31 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Attention, Performance(Human)), Behavior, Decision making, Visual signals, Visual perception, Analysis of variance.

An experiment was conducted to evaluate the effects of temporal and spatial uncertainty on visual monitoring behavior in a complex vigilance task with spatially arranged stimulus sources. The 3 stimulus sources of the display were arrayed over 144 degrees. A 2 x 2 randomized factorial design was used, with temporal certainty and uncertainty about when a signal will occur as one dimension of the design, and spatial certainty and uncertainty about where a signal will occur as the other dimension. All Ss had a practice and a criterion session of 2.5 hr duration, and there were 20 Ss in each of the 4 groups. Mean response latency for speed of signal detection increased as temporal and spatial uncertainty increased. Results were discussed in terms of temporal expectancies that cue S about the time of signal occurrence, and the observing response which directs S's head and eyes for the reception of visual stimuli. (Author)

AD-616 966 Div. 28/1

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
EFFECTS OF RANDOM AND ORDERLY PRESENTATIONS OF VISUAL SEQUENCES,
by Paul L. Weene. 26 Feb 65, 7p ESD TDR-64-612
Proj. 7682
Unclassified report

Pub. in Perceptual and Motor Skills v20 p897-903 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Visual perception, Inhibition), (*Display systems, Effectiveness), Performance tests, Time, Distribution, Identification, Analysis of variance, Cathode ray tubes.

Sections of figures were presented visually in random and orderly sequences. Later identification was easier for orderly sequences and for faster presentations. Fixation and size of section had no effect. (Author)

AD-616 977 Div. 32/8, 32/4
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
THE CONCEPT OF SCIENTIFIC CHOICE: A BRIEF REVIEW OF THE LITERATURE,
by Bruce L. R. Smith. Jun 65, 55p
Rept. no. P-3156
Unclassified report

Descriptors: (*Scientific research, Federal budgets), (*Federal budgets, Scientific research), United States Government, Costs, Economics, Decision making, Political science, Reviews.

The pressing need to make discerning use of scientific and technological resources has given rise to a series of efforts to define the concept of 'scientific choice.' The purpose of this paper is to present a brief review of that literature and to suggest some possible lines for future research.

AD-616 987 Div. 30/1
CFSTI Prices: HC$3.00 MF$0.75

Office of Aerospace Research, Washington, D. C.
RESEARCH OBJECTIVES 1965: PHYSICAL SCIENCES, ENGINEERING SCIENCES, ENVIRONMENTAL SCIENCES, LIFE SCIENCES.
Jun 65, 66p Rept. no. OAR 65-3
Unclassified report

Descriptors: (*Air Force research, Research

program administration), Physics, Nuclear physics, Chemistry, Mathematics, Electronics, Materials, Mechanics, Energy conversion, Astronomy, Astrophysics, Biology, Medical research, Social sciences, Psychology.

The Office of Aerospace Research (OAR), as the prime research agency of the United States Air Force, conducts research within its own laboratories and, through its grants' and contracts' program, sponsors scientific research among the leading scientists of the free world. This latter research is encouraged in areas of vital Air Force interest. It is the purpose, therefore, of this publication to further stimulate researchers in free-world colleges, universities, and nonprofit and industrial organizations to participate in the Air Force research program. By delineating the various facets of the four general areas of research (Physical Sciences, Engineering Sciences, Environmental Sciences, and Life Sciences), and by describing in detail the specific fields where additional research is required, OAR hopes to spark the enthusiasm of outstanding members of the free-world scientific community to play a part in fulfilling paramount Air Force research needs. (Author)

AD-617 018 Div. 28/3

Defence Research Medical Labs., Toronto (Ontario).
TESTS OF THE FUNCTIONS OF PROPRIOCEPTION AND INTERACTION OF SENSES.
Research paper,
by C. B. Gibbs and O. Logan. 18 Dec 64, 10p
Rept. no. DRML-RP-509
Proj. D77 94 20 23

Unclassified report

Pub. in Perceptual and Motor Skills v20 p433-42 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Proprioception, Psychomotor tests), (*Psychomotor tests, Proprioception), Sensory perception, Vision, End organs, Motor reactions, Reaction(Psychology), Reflexes, Visual perception, Touch, Analysis of variance.

It was hypothesized that the speed and direction of movement are monitored by proprioceptive feedback and that extent is edetermined by integrating the rate signals in time (Gibbs, 1954). Consideration of analogous servo mechanisms leads to the following predictions that were tested and confirmed ($p < 0.01$) in tests using 6 female and 4 male Ss. Input data from vision or proprioception alone or from both senses will produce rapid, primary adjustments of equal accuracy. Terminal accuracy was measured to show that the end-points of most residual errors lie in a limited zone of clear central vision, as required by hypotheses. Various previous estimates alleging gross inaccuracy of proprioceptors (Ludvigh, 1952; Crawford, 1960) are shown to be erroneous and irrelevant. (Author)

AD-617 019 Div. 28/3

Defence Research Medical Labs., Toronto (Ontario).
INTERACTION OF FORM AND EXPOSURE TIME IN THE PERCEPTION OF SLANT.
Research paper,
by A. H. Smith. 23 Dec 64, 10p
Rept. no. DRML-RP-579
Proj. D77 94 20 46

Unclassified report

Pub. in Perceptual and Motor Skills v20 p481-90 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Geometric forms, Visual perception), (*Visual perception, Geometric forms), Time, Reaction-(Psychology), Correlation techniques, Canada.

Groups of 24 Os estimated the slant of a circle and a rectangle (Groups I, II, and III) or a circle and a square (Group IV) by setting a tilt-rod. The forms were viewed at 45 degrees slant, monocularly and binocularly, with fixed head, under reduced conditions. Exposure durations were: for Groups I, II, and IV, 5, 4, 3, 2, and 1 sec., imposed in descending order; and for Group III, five 3-sec. exposures. Groups I and III left the tilt-rod at the response setting, and Groups II and IV returned it to vertical, after each response. With reduced exposure, over-all estimates of slant decreased for the response setting (Group I), but decreased less (Group IV), or did not change significantly (Group II) for the vertical setting. The difference between the estimates for the circle and rectangle or square increased with reduced exposure time due mainly to decrement for the angular forms. The discussion relates the over-all result to an anchor effect of tilt-rod position, and the trend difference for form to differential salience of projective outline distortion and convergence. (Author)

AD-617 030 Div. 32/11, 32/2

Ohio State Univ., Columbus.
LANGUAGE BARRIERS AND LANGUAGE TRAINING,
by John W. Black. 1963, 28p

Unclassified report

Pub. in Communication Processes, Proceedings of a Symposium held in Washington 1963, p101-28 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Language, Social communication), (*Speech, Intelligibility), Speech recognition, Speech representation, Vocabulary, Training, Students, Voice communication systems, Statistical analysis.

Conclusion: The language barrier is not all-important; adventurous people and entrepeneurs have taken it in stride. Nevertheless, it is real and it penalizes individuals who attempt to listen to words of another language community. It also penalizes people who attempt to say words in a language other than their own. These acoustic effects are somewhat ameliorated by training. The vocabulary and grammar of another language can also be overcome by formal training in the classroom, or through individual study. A body of statistical information about the errors that people make in listening to words and in anticipating phrases of prose suggests that the loci of failures, the places where help is needed, are almost the same among native speakers of a language and individuals who have come to the language through training. This implies a need for transmitting concomitantly both a message and a series of 'avoidance' ones, messages that 'fit' but that do not serve the intended purpose. This is recognized as being feasible for machines; the human counterpart is not far fetched. The conclusion is tempting that the language barrier is logically little or no more than a mathematics barrier, or any other problem of formal education. This conclusion, as does this paper, ignores an array of serious matters that arise from an identification of the speaker with his language. This involvement may cut deep; it may be the essence of the barrier. Otherwise, and except for matters of rate in oral communication, we can cope with inter-lingual communication through an extension of acoustic lexicons -- and this may be the essence of a contrived language, through international involvements, and through exploiting the statistics of language to the utmost. (Author)

AD-617 059 Div. 23/3, 23/1
CFSTI Prices: HC$3.00 MF$0.75

George Washington Univ., Washington, D. C.

FACTORS INFLUENCING NURSES IN SELECTION OF EMPLOYMENT: A SURVEY OF AN AREA WHERE COMPARATIVELY LOW PAYING COMMUNITY HOSPITALS COMPETE WITH HIGHER PAYING FEDERAL HOSPITALS FOR THE REGISTERED NURSES AVAILABLE,
by James E. Gabriel. Jun 65, 94p

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Nurses, Job analysis), (*Hospitals, Selection), (*Job analysis, Nurses), Wages, Employee relations, Time, Factor analysis, Decision making.

A survey of the registered nurses working in five hospitals in one area reveals that they are influenced to different degrees by a variety of employment factors and are attracted to the hospital that offers the factors they consider most important. Generally, the most important factors to the community hospital nurses are those that make work compatible with home responsibilities; they will sacrifice material rewards in order to have 'choice of shift.' In general, the Federal hospital nurses are most concerned with the more career connected factors of 'pay rate,' 'employee benefits,' and 'advancement.' (Author)

AD-617 081 Div. 28/2
CFSTI Prices: HC$2.00 MF$0.50

Georgia Inst. of Tech., Atlanta.
MORALE. A SPECIAL PROBLEM REPORT.
Master's thesis,
by Donald L. Moore. Mar 65, 45p
Contract AF33 608 1063

Unclassified report

Descriptors: (*Attitudes, Psychometrics), (*Industrial psychology, Attitudes), Job analysis, Performance(Human), Reviews, Personnel management.

The paper is a literature review on the subject of morale. From this review, an attempt was made to define morale and present some of the methods of measuring it. Thoughts are presented on the reliability and validity of the measuring device and a discussion is given as to whether or not morale is a dependent or independent variable.

AD-617 086 Div. 32/3, 30/2
CFSTI Prices: HC$4.00 MF$1.00

Computer Usage Co., Inc., Bethesda, Md.
SELECTIVE DISSEMINATION OF INFORMATION.
1965, 127p

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Documentation, Distribution), (*Programming(Computers), Documentation), Dictionaries, Medical research, Programming languages, Punched cards, Instruction manuals.

The SDI system consists of ten different runs including three sorts. All programs are contained on a Master Instruction Tape (SDI-MIT) which was generated by using the MASCOT 50 function. One sort is contained on the SDI-MIT and has fixed parameters. This one sort is to be used for each of the three sort runs.

AD-617 103 Div. 32/9
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AUTOMATION, JOBS AND THE GOLDEN RULE,
by Richard Bellman. Jun 65, 6p
Rept. no. P-3159

Unclassified report

Prepared for presentation at the Cybercultural Conference, New York, New York, May 27-29, 1965.

Descriptors: (*Sociology, Automation), (*Automation, Sociology), Urban areas, Population, Education, Police, Traffic, Sanitary engineering, Noise, Hospitals, Culture.

Various human services are suggested as possible employment opportunities in a society where automation is rapidly increasing.

AD-617 114 Div. 28/5, 15/1
CFSTI Prices: HC$3.00 MF$0.75

Delaware Univ., Newark. Center for Research on Social Behavior.
REWARD STRUCTURE AND COOPERATION: THE DECOMPOSED PRISONER'S DILEMMA GAME.
Technical rept.,
by Dean G. Pruitt. 14 Jun 65, 53p
Rept. no. TR-14
Contract Nonr228502

Unclassified report

Descriptors: (*Game theory, Decision making), (*Behavior, Decision making), Group dynamics, Social psychology, Test construction(Psychology), Analysis of variance.

The behavior elicited by different Prisoner's Dilemma Games (where the player must focus on the outcome of joint actions) is compared to that elicited by Decomposed Prisoner's Dilemma Games (where the player may focus on the outcome of individual actions).

AD-617 118 Div. 32/3, 30/2
CFSTI Prices: HC$3.00 MF$0.75

Harry Diamond Labs., Washington, D. C.
A MULTIPLE TESTING OF THE ABC METHOD AND THE DEVELOPMENT OF A SECOND-GENERATION MODEL. PART I. PRELIMINARY DISCUSSIONS OF METHODOLOGY. SUPPLEMENT. COMPUTER PROGRAMS OF THE HDL INFORMATION SYSTEMS,
by Berthold Altmann and William G. Brown.
Apr 65, 96p Rept. no. TR-1295
Projs. DA1L013001A91A, 01201

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Programming(Computers), Data processing systems), (*Information retrieval, Analysis), (*Subject indexing, Operations research), Catalogs, Language, Reports, Documentation, Effectiveness, Computers.

The first-generation ABC storage and retrieval method, an HDL-developed method that utilizes appropriate standardized English-language statement processed and printed by a KWIC-type computer program, was subjected to a performance test. The test was performed with the primary objective to spot deficiencies and to develop the second-generation ABC model. The results are briefly reported. The improved

model is characterized by descriptors of unlimited length, the introduction of facets or microschedules that produce logical organization of documents under important keywords, and a decrease in the number of verbalized concepts. Type of document, level-of-difficulty descriptions and operating parameters of equipments (a feature of the ABC method are transferred to card catalogs. (Author)

AD-617 139 Div. 28/3, 15/1
CFSTI Prices: HC$3.00 MF$0.75

Boeing Scientific Research Labs., Seattle, Wash.
THE LIE ALGEBRA OF VISUAL PERCEPTION.
Mathematical note,
by William C. Hoffman. Apr 65, 54p
Rept. nos. D1-82-0432, MN-408
Unclassified report

Also available from the author.

Descriptors: (*Visual perception, Algebras), (*Algebras, Visual perception), Groups(Mathematics).

The familiar perceptual constancies of image location in the field of view, image orientation, size constancy, shape constancy, binocular distortion, and motion, have their natural mathematical expression in terms of Lie groups of transformations over the visual manifold. If Lie's three fundamental theorems are to be satisfied three additional perceptual invariances must also be present: time, efferent binocularity, and what apparently constitutes some sort of circulating memory in spacetime. This Lie algebra of visual perception admits ready explanations for the following visual phenomena: the developmental sequence of infant vision; orthogonal after-images; after-effects of seen movement; the spiral after-effect and the spiral images sometimes evoked under flicker; reading reversals; and the visual analogue of the Fitzgerald contraction. The theory also predicts certain new complementary (orthogonal) after-images, the existence of which have been verified experimentally. (Author)

AD-617 201 Div. 28/3

Defence Research Medical Labs., Toronto (Ontario).
THE PHASE DIFFERENCE FUNCTION IN BINOCULAR FLICKER.
Research paper,
by P. J. Foley and P. Stager. 14 Apr 64, 9p
Rept. no. RP-545
Proj. D77 94 20 46
Unclassified report

Pub. in Canadian Journal of Psychology v19 n1 p47-55 1965 (Copies available only to DDC users). Abstract in French and English.

Descriptors: (*Visual perception, Light pulses), Eye, Vision, Phase measurement, Luminescence, Stimulation, Optics, Nervous system, Physiology, Psychophysiology, Analysis of variance, Canada.

Two experiments were carried out to determine the functional relation between the critical flicker frequency (CFF) of two identical intermittent targets, binocularly superimposed, and the phase difference between the targets. Binocular CFF is a monotonic decreasing function of phase difference, positively accelerated for phase differences between 0 and 180 degrees, and negatively accelerated for phase differences between 360 and 180 degrees. It is postulated that the results can be accounted for by assuming the existence of something akin to the 'isodynamic' cells of Cajal, and that more weight is attached to the input to these cells from one eye than from the other. (Author)

AD-617 202 Div. 28/3

Defence Research Medical Labs., Toronto (Ontario).
THE BEHAVIOURAL BASIS OF PERCEIVED SIZE AND DISTANCE.
Research paper,
by James G. Taylor. 8 Sep 64, 14p
Rept. no. RP-569
Proj. D77 94 20 46
Unclassified report

Pub. in Candian Journal of Psychology v19 n1 p1-14 1965.
(Copies available only to DDC users).
Abstract in French and English.

Descriptors: (*Space perception, Theory), (*Behavior, Space perception), Perception(Psychology), Visual perception, Sensory perception, Vision, Motion, Stimulation, Equations, Canada.

It is suggested that perceived distance is a function of behaviour that is quantitatively adjusted to the distances of objects. This behaviour is conditioned to compound stimuli whose components include changes of stimulation due to movement. If some of the cues, and particularly those that depend on movement, are eliminated experimentally, there is a quantitative decrease in the behaviour that tends to be evoked, with a consequent shrinkage in perceived distance. This accounts for the common finding that perceived distance is a negatively accelerated increasing function of distance. Perceived size is a function of behaviour quantitatively adjusted to the dimensions of objects. If this behaviour can be evoked by objects at a distance we get size constancy. In this case the cues include those that are conditioned to distance responses, and the result is size-distance invariance. This invariance is disrupted by cue reduction. For example, elimination of distance cues dependent on motion results in increasing overestimation of size as distance increases. Two size illusions are explained in terms of the theory. (Author)

AD-617 203 Div. 28/1, 28/2, 28/3

Defence Research Medical Labs., Toronto (Ontario).
A COMPARISON OF FREE-MOVING AND PRESSURE LEVERS IN A POSITIONAL CONTROL SYSTEM.
Research paper,
by D. Burke and C. B. Gibbs. 1964, 7p
Rept. no. RP-538
Proj. D77 94 20 23
Unclassified report

Pub. in Ergonomics v8 n1 p23-9 Jan 1965
(Copies available only to DDC users).
Abstract in French, German and English.

Descriptors: (*Position finding, Control systems), (*Performance(Human), Control systems), Tracking, Errors, Reflexes, Proprioception, Pressure, Control sticks.

Ten subjects were used in comparative tests of pressure and free-moving control levers in a task of pursuit tracking, using a positional control system with zero lag. Pressure control was superior to that free-moving lever at the $p<0.01$ level of confidence. Data are provided on the subjects' delays in responding to a step change of uniform velocity. (Author)

AD-617 214 Div. 32/2

Ohio State Univ., Columbus.
SPEECH AND AURAL COMPREHENSION OF FOREIGN STUDENTS,
by John W. Black, Sadanand Singh, Oscar Tosi, Yukio Takefuta, and Elizabeth Jancosek. 19 Nov 64, 6p
Contract Nonr49518

Unclassified report

Pub. in Journal of Speech and Hearing Research v8 n1 p43-8 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Speech, Auditory perception), (*Auditory perception, Speech), (*Language, Auditory perception), Reading, Performance tests, Verbal behavior, Effectiveness, Intelligibility, Students.

Each of three groups of university students for whom English was a second language, 24 Japanese-, 24 Hindi-, and 24 Spanish-speaking students, was divided into subgroups on the basis of efficiency in aural comprehension. All of the students recorded lists from an English-language intelligibility test and short segments of English prose. Three sets of measures were obtained: (a) intelligibility scores, (b) ratings of foreignism in speech, and (c) the amount of vocalized time in a set reading task. The object of the study lay in relating aural comprehension to other manifestations of speech behavior, not in comparing the three groups of students. Relative skill in aural comprehension was found to differentiate each language group in intelligibility, in degree of foreignism, and in vocalized time as well. (Author)

06. Biological and Medical Sciences

AD-616 454 Div. 16/1, 16/3

Presbyterian-St. Luke's Hospital, Chicago, Ill.
UPTAKE OF A NEW HYDROPHOBIC FLUORESCENT DYE BY HUMAN PLATELETS,
by R. M. Lycette, W. F. Danforth, J. L. Koppel, and J. H. Olwin. 18 May 64, 3p
Contract DA49 193md2171; Grant NIH HE03940 06
Unclassified report

Pub. in Proceedings of the Society for Experimental Biology and Medicine v117 p797-99 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Blood platelets, Dyes), (*Fluorescence, Dyes), (*Dyes, Fluorescence), Biological stains, Ethylenedinitrilo tetraacetates, Adsorption, Surface properties, Lipids.

A method for uptake of a new hydrophobic fluorescent dye (STC) by human blood platelets is described in which cell concentrations are constant and those of dye varied widely. Uptake is measured is isotonic saline buffered with EDTA at a pH of 3.5, where cells are near their isoelectric point and dye maximally affixed to them. Dye uptake did not fit usual patterns of adsorption. At all platelet weights, the amount of added dye bound increased with increasing strengths of dye, being nearly proportional to the square of the concentration of remaining dye. Data from several normal platelet donors show maxima in per cent of dye taken up and slight differences in this per cent of dye over a wide range of dye added. This suggests varying amount of hydrophobic substances in or on platelets and a means for their assay. (Author)

AD-616 473 Div. 16/2, 4/4

Minnesota Univ., Minneapolis. Lab. for Biophysical Chemistry.
DIELECTRIC DISPERSION OF PROTEIN SOLUTIONS CONTAINING SMALL ZWITTERIONS,
by Rufus Lumry and Robert Hon-Sang Yue.
28 Sep 64, 13p
Contract Nonr71055
Unclassified report

Pub. in Journal of Physical Chemistry v69 n4 p1162-74 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Proteins, Dielectric properties), Ions, Electric moments, Reaction kinetics, Hemoglobin, Pigments, Enzyme precursors, Serum albumen, Relaxation time.

The molecular mechanism responsible for the dielectric-dispersion behavior of small globular proteins was examined using measurements in the presence and absence of small dissolved zwitterions. The zwitterions eliminate complications due to electroviscous effects and dielectric effects of the ion atmosphere. They have relatively little influence on the Kirkwood-Shumaker effect. The kinetics of the latter are analyzed on the basis of known rates for proton processes to show that in the range of pH from 6.5 to 9, little complication due to these effects is to be expected. The agreement between results obtained with and without zwitterions over a range of solvent conditions demonstrates that for sufficiently small proteins the solution dielectric properties are controlled by and measure the mean-square permanent dipole moment of the protein and the rotational relaxation behavior of the protein. The dielectric parameters for metmyoglobin, carboxymyoglobin, oxidized and reduced cytochrome-c, and chymotrypsinogen A are given for a variety of solution conditions. Distinct anomalies were found only in the cytochrome-c forms where relaxation time and dielectric increment increase with decreasing concentration of protein and in mixtures of bovine serum albumin with oxidized cytochrome-c. (Author)

AD-616 478 Div. 16/4

American Museum of Natural History, New York.
CATENOTAENIA CALIFORNICA DOWELL, 1953 AND OOCHORISTICA DESERTI MILLEMAN, 1955,
by Horace W. Stunkard. 1962, 2p
Grant NSF G23561
Unclassified report

Pub. in The Journal of Parasitology v48 n3 p495 Jun 1962.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Platyhelminths, Identification), Parasites, Worms, Classification.

In a recent article (J. Parasit. 47:847-856) the writer noted differences in descriptions of the same species by different authors and the confusion in their attempts to define, delimit, or distinguish between the genera Oochoristica Luhe, 1898; Catenotaenia Janicki, 1904; Atriotaenia Sandground, 1926; Mathevotaenia Akhumian, 1946; Skrjabinotaenia Akhumian, 1946; and Meggittina Linsdale, 1953. Indeed, Catenotaenia symmetrica Baylis, 1927 was transferred to the genus Oochoristica by Meggitt and Subramanian, 1927; redescribed as a new species, Oochoristica ratti, by Yamaguti and Miyata, 1937; and named as type of a new genus, Mathevotaenia by Akhumian, 1946. In the paper listed above, I ventured the presumption that Oochoristica deserti Milleman is identical with Catenotaenia californica from the same host and same locality. I am indebted to Dr. Clark P. Read of Rice University for a letter in which he states that he has material of both species in his collection and has collected both worms on many occasions. He states further that they are most certainly not of the same species and that he finds no reason for assuming that they are in the same genus. (Author) (Document quoted in its entirety.)

AD-616 479 Div. 16/4

American Museum of Natural History, New York.
INFECTION OF A CHILD IN MINNESOTA BY BERTIELLA STUDERI (CESTODA: ANOPLOCEPHALIDAE),
by Horace W. Stunkard, Teodor Koivastik, and George R. Healy. 1964, 10p
Grant NSF G23561
Unclassified report

Pub. in American Journal of Tropical Medicine and Hygiene v13 n3 p402-9 May 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Platyhelminths, Morphology(Biology)), (*Parasitic diseases, Children), (*Parasites, Platyhelminths), Infections, Identification, Worms, Minnesota.

A cestode, identified as Bertiella studeri, was obtained after therapy from a 5-year-old boy at Mankato, Minnesota. This case is apparently the first autochthonous infection of man by an anoplocephaline cestode reported in North America. The specimen is described and compared with specimens of B. studeri from a Rhesus monkey in Hamburg, Germany and a cotype of B. mucronata from the Helminthological Collection of the U.S. National Museum. Specificity in the genus Bertiella is discussed. (Author)

AD-616 480 Div. 16/4

American Museum of Natural History, New York.

KEYS TO THE TREMATODES OF ANIMALS AND MAN.
Book review,
by K. I. Skrjabin and Horace W. Stunkard. 1964, 2p
Grant NSF G23561 Unclassified report
Book review by Horace W. Stunkard.
Pub. in The Journal of Parasitology v50 n3 p480 Jun 1964.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Trematodes, Classification), Indexes, Reviews, Morphology(Biology), Identification, Parasites, Animals, Humans.

The compendium contains the keys to the trematodes included in the first twenty volumes of Trematody Zhivotnykh i Cheloveka (Trematodes of Animals and Man) published during the period 1947-1962 by the USSR Academy of Science. These volumes encompass the world literature, are compilatory rather than critical, and present the taxonomic system devised by Academician K. I. Skrjabin and his collaborators. Four additional volumes are scheduled.

AD-616 481 Div. 16/4

American Museum of Natural History, New York.
THE MORPHOLOGY, LIFE-HISTORY, AND SYSTEMATICS OF THE DIGENETIC TREMATODE, HOMALOMETRON PALLIDUM STAFFORD, 1904,
by Horace W. Stunkard. 1963, 12p
Grant NSF G23561 Unclassified report
Pub. in Biological Bulletin v126 n1 p163-73 Feb 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Trematodes, Morphology(Biology)), (*Life cycle, Trematodes), Parasites, Marine biology, Fishes, Larvae, Adults, Identification.

The successive stages in the life-history of Homalometron pallidum, a parasite of Fundulus heteroclitus, described by Linton, 1901 and named by Stafford, 1904, have been discovered and identified. The asexual generations are in Hydrobia minuta and the metacercarial stages are encysted in Gemma gemma, H. minuta, and small polychaete annelids which serve as secondary intermediate and transfer hosts. Knowledge of larval as well as adult stages gives a better basis for determination of the evolution and systematics of the allocreadiid-leprocreadiid trematodes. The subfamily Homalometroninae contains marine, brackish-, and fresh-water species. Manter (1963) discussed the geographical dispersal of the group and the possible significance of present distribution for the phylogeny and evolution of the parasites and of their hosts. In his opinion, the subfamily illustrates an evolution from marine ancestors, through secondary-division hosts, to become parasites of fresh-water fishes. Results of the present investigation support his hypothesis. (Author)

AD-616 482 Div. 16/4

American Museum of Natural History, New York.
NEW INTERMEDIATE HOST FOR PARVATREMA BOREALIS STUNKARD AND UZMANN, 1958 (TREMATODA),
by Horace W. Stunkard. 1961, 2p Unclassified report
Grant NSF G23561
Pub. in The Journal of Parasitology v48 n1 p157 Feb 1962 (Copies not available to DDC or Clearinghouse customers).
Descriptors: (*Trematodes, Life cycle), (*Parasites, Birds), Parasitic diseases, Morphology(Biology), Identification, Maine.

AD-616 483 Div. 16/4

American Museum of Natural History, New York.
ON THE SPECIFIC IDENTITY OF THE DIGENETIC TREMATODE MONOSTROMUM MOLLE LEIDY, 1856 AND HERONIMUS CHELYDRAE MACCALLUM, 1902,
by Horace W. Stunkard. 16 Sep 63, 3p
Grant NSF G23561
Unclassified report

Pub. in The Journal of Parasitology v50 n1 p99-100 Feb 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Trematodes, Identification), Reptiles, Lungs, Parasites, Platyhelminths, Morphology(Biology).

Heronimus chelydrae MacCallum, 1902, the digenetic trematode from the lungs of North American turtles, is specifically identical with Monostomum molle Leidy, 1856. The name of the species is emended to Heronimus mollis (Leidy, 1856) n. comb. (Author)

AD-616 484 Div. 16/4

American Museum of Natural History, New York.
THE ORGANIZATION, ONTOGENY, AND ORIENTATION OF THE CESTODA,
by Horace W. Stunkard. 1962, 13p
Grant NSF G23561
Unclassified report

Pub. in The Quarterly Review of Biology v37 n1 p23-34 Mar 1962
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Platyhelminths, Morphology(Biology)), Identification, Parasites, Parasitic diseases, Life cycle, Classification.

Consideration of the organization, ontogeny, and orientation of tapeworms, and comparison with the structure and development of other invertebrates, support the opinion that the cestode is an individual rather than a colony and that the transformation of the oncosphere to a procercoid or cysticercoid is a true metamorphosis in which there is a reversal of the antero-posterior axis. (Author)

AD-616 485 Div. 16/4

American Museum of Natural History, New York.
PLATYHELMINTHES,
by Horace W. Stunkard. 1961, 5p
Grant NSF G23561
Unclassified report

Pub. in The Encyclopedia of Biological Sciences p807-10 1961
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Platyhelminths, Classification), (*Morphology(Biology), Platyhelminths), Identification, Parasites, Worms, Marine biology.

AD-616 486 Div. 16/4

American Museum of Natural History, New York.
STUDIES ON THE TREMATODE GENUS RENICOLA: OBSERVATIONS ON THE LIFE-HISTORY, SPECIFICITY, AND SYSTEMATIC POSITION,
by Horace W. Stunkard. 1963, 24p
Grant NSF G23561 Unclassified report

Pub. in Biological Bulletin v126 n3 p467-89 Jun 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Trematodes, Morphology(Biology)), Parasites, Worms, Life cycle, Parasitic diseases, Identification.

AD-616 487 Div. 16/4

American Museum of Natural History, New York.
SYSTEMATICS, TAXONOMY, AND NOMENCLATURE OF THE TREMATODA,
by Horace W. Stunkard. 1963, 14p Unclassified report
Grant NSF G23561
Pub. in Quarterly Review of Biology v38 n3 p221-33 Sep 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Trematodes, Morphology(Biology)), Parasites, Worms, Classification, Identification.

The diverse taxonomic arrangements recently proposed for the class Trematoda are reviewed. The division of the class into two orders, Monogenea and Digenea, has proved inconsistent, inadequate, and inept. The system advocated by Stunkard (1962) disposes of the component groups of the Trematoda in accord with morphological and developmental data. The integrity and validity of the class Trematoda is maintained to include both monogenetic and digenetic forms. The polystomes and related categories are included in the subclass Pectobothridia, and the Malacobothridia of Burmeister is expanded to include two orders, the Aspidogastrea and the Digenea. With this revision, the arrangement corresponds with the classification of Burmeister (1856), and his names are retained. An outline of the system is sketched. (Author)

AD-616 488 Div. 16/4

American Museum of Natural History, New York.
TAENIOCOTYLE NOM, NOV. FOR MACRASPIS OLSSON, 1869, PREOCCUPIED, AND SYSTEMATIC POSITION OF THE ASPIDOBOTHREA,
by Horace W. Stunkard. 1960, 13p Unclassified report
Grant NSF G23561
Pub. in Biological Bulletin v122 n1 p137-48 Feb 1962(Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with Marine Biological Lab., Woods Hole, Mass.

Descriptors: (*Trematodes, Morphology(Biology)), Parasites, Worms, Fishes, Marine biology, Life cycle, Classification, Identification.

Taeniocotyle nom. nov. is proposed to replace Macraspis Olsson, 1869, homonym of Macraspis MacLeay, 1819, a coleopterous insect. It designates certain trematode worms, from the gall-bladders of selachian fishes, that belong to the family Aspidogastridae Poche, 1907 and the order Aspidobothrea Burmeister, 1856. The systematic position of this group, often regarded as intermediate between the Monogenea and Digenea, is reviewed. From morphological and developmental evidence, the Aspidobothrea and Digenea are included in the subclass Malacobothridia Burmeister, 1856. (Author)

AD-616 489 Div. 16/1, 16/3

Miami Univ., Coral Gables, Fla. School of Medicine.
GLUCOSE ABSORPTION AND TRANSPORT BY THE INTESTINAL ILEUM OF ALBINO RATS,
by Martha Ellert, A. S. Nunn, Jr., and Patricia Howard. 1965, 1p
Contract DA49 193MD2415
Unclassified report

Pub. in Federation Proceedings v24 n2 Mar-Apr 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Glucose, Absorption(Biological)), (*Absorption(Biological), Glucose), (*Intestines, Absorption(Biological), Rats, Surgery, Diet.

In previous studies the absorption and transport of glucose by the lower small intestine of albino rats has been shown to be markedly less than that of the duodenum and jejunum. By jejunectomy, and direct end to end anastomosis of the duodenum and ileum, it was possible to test the adaptation of the ileum for the absorption of sugars. Surgical controls consisted of rats that had undergone proximal jejunotomy. Following each operative procedure a forty day surgical recovery was instigated. During this time the animals received a diet of Purina rat chow and water ad libitum, or Purina rat chow and 10% glucose in water. Changes in the absorptive capacity of the ileum were tested by the in vitro method of Crane and Wilson. In all cases, the addition of dietary glucose resulted in increased glucose absorption and transport by all but the most distal segment adjacent to the ileo-cecal junction. Changes in ileal monophosphoesterase activities were also determined. (Author) (Document quoted in its entirety.)

AD-616 498 Div. 16/1

Linde Div., Union Carbide Corp., Tonawanda, N. Y.
PHYSIOLOGICAL EFFECTS OF THE NOBLE GASES ON FROG SCIATIC NERVE AND GASTROCNEMIUS MUSCLE,
by Sheldon F. Gottlieb and J. M. Weatherly.
12 Aug 64, 5p
Contract Nonr411500
Unclassified report

Pub. in American Journal of Physiology v208 n3 p407-11 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Helium group gases, Physiology), (*Muscles, Helium group gases), (*Nerve impulses, Helium group gases), Amphibians. Pressure, Nerves, Thresholds(Physiology), Fatigue(Physiology), Contraction, Argon, Helium, Krypton, Neon, Nitrogen, Nitrogen compounds, Oxides, Xenon.

Evidence has been obtained which indicates that pressures up to 200 psi (gauge pressure) of helium, neon, nitrogen, or argon have no adverse effects on the ability of frog gastrocnemius muscles to produce tension when stimulated either directly or indirectly via the nerve. These gas tensions were without effect on nerve threshold and ability of nerve to conduct impulses. Experiments revealed that high tensions of gases do not result in fatiguing muscle at a faster rate than at 1 atm air. Krypton may have had a slight inhibitory effect on muscle ability to produce tension. Xenon or nitrous ocide, 100 psi, exerted a profound inhibitory effect on ability of gastrocnemius muscles to produce tension. These two gases appeared to have primarily a direct effect on muscle. On isolated sciatic nerve preparations, it was found that 100 psi xenon or 80 psi nitrous oxide exerted a slight depressing effect on nerve excitability. As the Pxe or PN2O increased, nerve excitability decreased at a more rapid rate. The decreased nerve excitability was completely reversible. (Author)

AD-616 527 Div. 16/1, 6/6
CFSTI Prices: HC$1.00 MF$0.50

Holman (John F.) Co., Inc., Washington, D. C.
POSSIBLE UTILIZATION OF THE HUMAN OCULO-MOTOR SYSTEM FOR CONTROL PURPOSES,
by A. Lauringson. Jun 65, 11p
Contract DA44 009AMC930T,
Proj. 4A014501A52C0210
AERDL T-1788-65; TT 65-62492
Unclassified report

O Vozmozhnosti Ispolzovaniya Glazodvigatelnoi Sistemy Cheloveka v Tselyakh Upravleniya,. trans. of Academy of Sciences of the Estonian SSR. Institute of Cybernetics n2 p121-6 1964.

Descriptors: (*Eye, Tracking), (*Tracking, Eye), Muscles, Adaptation(Physiology), Motion, Control systems, Electronic recording systems.

The relative efficiency and adaptation of the human operator and oculomotor systems as tracking systems of moving objects are discussed. The oculomotor was found to be more effective. Its substitution for the operator system type of tracking system is therefore considered quite feasible. (Author)

AD-616 543 Div. 16/4, 16/3, 16/9, 16/1, 16/10
CFSTI Prices: HC$1.00 MF$0.50

Army Medical Research and Nutrition Lab., Denver, Colo.
BIBLIOGRAPHY OF U. S. ARMY MEDICAL RESEARCH AND NUTRITION LABORATORY REPORTS AND REPRINTS FOR 1964.
1964, 4p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Medical research, Bibliographies), (*Military medicine, Medical research), Nutrition, Metabolism, Neoplasms, Biochemistry, Irradiated foods, Vitamins.

AD-616 565 Div. 16/4, 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SOME MATHEMATICAL ASPECTS OF OPTIMAL PREDATION IN ECOLOGY AND BOVICULTURE.
Revised ed.,
by Richard Bellman. 8 Mar 60, 6p Rept. no. P-1911
Unclassified report

Revision of manuscript dated 17 Feb 60.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Ecology, Dynamic programming), (*Optimization, Population), Bovines, Rhythm(Biology), Stochastic processes, Population(Mathematics).

General mathematical problems arising in the scientific study of predation have been studied from a variety of viewpoints. Primary emphasis has been given to the descriptive aspects of the prey and predator populations under various assumptions concerning interactions among the different members of the populations during these processes and to birth and death processes. The major objective of this note is to show how the functional equation technique of a new mathematical discipline, dynamic programming, can be used in formulating and solving--both analytically and numerically--a variety of problems of optimal predation. We wish to determine optimal predation policies and are thus interested in the control, as opposed to the descriptive, aspects of predation processes. (Author)

AD-616 628 Div. 16/4
CFSTI Prices: HC$1.00 MF$0.50

Laboratory for the Study of Sensory Systems, Tucson, Ariz.
FEASIBILITY STUDIES LEADING TO THE STUDY OF OLFACTION IN ELASMOBRANCHS BY REMOTE CONTROL.
Final rept.,
by Howard A. Baldwin and Glen F. Ingle. 25 Oct 63, 22p
Contract DA49 092ARO14
Unclassified report

Descriptors: (*Smell, Fishes), (*Fishes, Chemoreceptors), (*Sensory mechanisms, Smell), Feasibility studies, Remote control systems, Thresholds(Physiology), Stimulation, Nerves, Odors, Central nervous system, Behavior, Sensitivity, Telemeter systems, Transmitter-receivers, Monitors.

Techniques for the study of olfaction in elasmobranchs have been considered and apparatus which would allow for the stimulation and observation of an untethered shark is described. A remotely controlled stimulus system was constructed and tested. Devices for the detection and transmission of physiological responses in the shark are described but they have not yet been tested in an experimental animal. No evidence which would preclude the study of olfaction by remote control and observation techniques has developed in this initial investigation. (Author)

AD-616 692 Div. 16/11, 4/3
CFSTI Prices: HC$1.00 MF$0.50

New Hampshire Univ., Durham.
CHEMICAL SYNTHESES OF ACTINOMYCIN ANALOGS.
Annual rept. no. 3, Jun 63-Jun 64,
by Robert E. Lyle and Mu Tsu Wu. 15 Mar 65, 20p
Grants 139R1, DA CML18 108 61G28
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-402 392.

Descriptors: (*Antibiotics, Synthesis(Chemistry)), (*Streptomycins, Synthesis(Chemistry)), (*Peptides, Synthesis(Chemistry)), Carboxylic acids, N-heterocyclic compounds, O-heterocyclic compounds, Amino acids, Nicotinic acid, Pharmacology, Toxicity.

Preliminary pharmacological studies of amino acid derivatives of nicotinic, 4-phenoxathiin carboxylic, and 2-amino-3-oxo-3H-phenoxazine-4,6-dicarboxylic acids are reported. The syntheses of the latter is described. (Author)

AD-616 693 Div. 16/2, 14/4, 14/7, 14/8, 14/9, 14/10
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.

METHODS FOR DETERMINING THE RESISTANCE OF NON-METALLIC MATERIALS TO THE DESTRUCTIVE ACTION OF FUNGI,
by B. K. Flerov, M. S. Maslennikova, and D. A. Surovtseva. Nov 63, 11p Trans-945
TT 65-62499

Unclassified report

Trans. of Mikrobiologiya (USSR) v32 n3 p551-7 1963.

Descriptors: (*Fungus deterioration, Materials), (*Materials, Fungus deterioration), Tropical regions, Wood, Adhesives, Fibers(Natural), Plastics, Rubber, Paints, Plants(Botany), Culture media, Growth, Nutrition, Fungi, Dust, Test methods, USSR.

AD-616 694 Div. 16/2, 16/10
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
CASES OF ANTHRAX IN MAN,
by A. M. Sorina. Nov 63, 5p Trans-946
TT 65-62500

Unclassified report

Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR) v40 n5 p152-3 1963.

Descriptors: (*Bacillus anthracis, Humans), Diseases, Vaccines, Bovines Diagnosis, Culture media, Growth, Epidemiology.

Conclusions:
Full grown cattle served as the source of spreading of anthrax infection among humans during the 1959 outbreak. A cutaneous form of anthrax was recorded exclusively. In persons who used raw milk from sick cows for food, anthrax wasn't recorded. In persons who received antianthrax serum as a prophylactic measure, a light course of illness was noted with some atypical clinical aspects. (Author)

AD-616 695 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
A STUDY OF THE ANTIGENIC STRUCTURE OF THE PLAGUE BACILLUS (PASTEURELLA PESTIS EV NIIEG) WITH THE AID OF DIFFUSION PRECIPITATION IN AGAR,
by V. L. Pustovalov, N. G. Ovanesova, A. M. Konnova, and L. I. Kolesnikova. Nov 63, 17p
Trans-947
TT 65-62501

Unclassified report

Trans. of mono. Particularly Dangerous and Naturally Focal Infections, Moscow, 1962 p140-9.

Descriptors: (*Pasteurella pestis, Antigens + antibodies), Microbiology, Immunology, Antigen-antibody reactions, Purification, Culture media, Test methods.

Conclusions: Ascheme has been proposed for the distribution of 28 precipitation zones, caused by antigenic substances of the plague bacillus (P. pestis EV NIIEG) cultivated on a medium of caseinic acid hydrolysate. The distribution has been studied of the antigens in fractions from an extract of plague bacillus which were obtained by separation with ammonium sulfate. The heterogeneity was shown of fraction I of Baker et al. which consists of at least 6 components. The purity was confirmed of fractions IA and IB isolated according to the scheme of Baker et al. from an admixture of other antigens. (Author)

AD-616 696 Div. 16/2, 16/10
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
EFFECT OF ROENTGEN RAYS ON THE COURSE OF VACCINAL PROCESSES AND ON THE DEGREE OF IMMUNITY FOLLOWING ANTITULAREMIA IMMUNIZATION,
by R. A. Saveleva. Dec 63, 4p Trans-981
TT 65-62502

Unclassified report

Trans. of Meditsinskaya Radiologiya (USSR) v7 n10 p68-9 Oct 1962.

Descriptors: (*Radiation effects, Immunity), (*Vaccines, Radiation effects), (*Pasteurella, Vaccines), X-rays, Diseases, Radiobiology, Radiation sickness, Guinea pigs, USSR.

AD-616 697 Div. 16/11, 16/4, 32/1
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
THE HYGIENE AND TOXICOLOGY OF MAJOR INSECTOFUNGICIDES USED IN AGRICULTURE, CHIEFLY IN THE COTTON GROWING INDUSTRY,
reviewed by S. M. Tregobov. Feb 64, 4p
Trans-1019
TT 65-62503

Unclassified report

Trans. from Gigiena Truda i Professionalnye Zabolevaniya (USSR) v7 n5 p61 1963, review of mono. Gigiena i Toksikologiya Vazhneishikh Insektofungitsidov Primenyaemkh v Selskom Khozyaistve, Glavnym Obrazom v Khlopkovodstve, Tashkent, 1961 60p.

Descriptors: (*Insecticides, Toxicity), (*Fungicides, Toxicity), Agriculture, Cotton, Pesticides, Poisoning, Organic phosphorus compounds, Arsenic compounds, Chlorides, Reviews, USSR.

AD-616 698 Div. 16/10
CFSTI Prices: HC$1.00 MF$0.50

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
SKIN TEMPERATURE CHANGES CAUSED BY INTENSE DIFFUSE THERMAL RADIATION.
Final rept. for Oct 61-Aug 64,
by W. C. Kaufman. Apr 65, 13p AMRL TR-65-64
Proj. 7164, Task 716409

Unclassified report

Descriptors: (*Thermal radiation, Skin), (*Skin, Thermal radiation), Burns, Stress(Physiology), Tolerances(Physiology), Temperature, Hands, Pain, Radiometers, Infrared lamps, Optical filters, Glass.

The rates at which critical levels of temperature are attained by the natural human skin exposed to intense thermal radiation have been studied using infrared quartz lamps. Early studies were done in a static aircraft in which a human subject in the cockpit was exposed to thermal radiation produced by 1,000 infrared lamps. Later, for more definitive studies, a radiometer and an infrared source, having irradiances that could be controlled between 0.06 and 0.7 cal/sq cm sec, were constructed so that precise surface temperature measurements could be made during exposure to various intensities of thermal radiation. Spectra were varied by filtering through

different substances. The whole dorsum of the hand was exposed and intradermal and subdermal temperatures were recorded from 0.13 mm thermocouples threaded through the skin. The rate of temperature rise is a function of the irradiance and the spectral characteristics of the source, the optical filter, and the skin. Plate glass, plexiglass, and a laminated glass aircraft windshield attenuated the temperature response by 0.3, 0.5, and 0.7 respectively in comparison with the unfiltered energy. Blackening the skin increased the rate of rise during exposure to plexiglass-filtered energy by a factor of 3.2. The rate of response to unfiltered energy increased by only a factor of 1.6. The rate of temperature change for natural skin exposed to intense thermal radiation is approximately one-half that of ink-blackened skin. These data have extensive civil defense, fire-fighting, and military application. (Author)

AD-616 718 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Naval Medical Field Research Lab., Camp Lejeune, N. C.
THE ROLE OF MYCOPLASMA (PLEUROPNEUMONIA-LIKE ORGANISMS) IN HUMAN DISEASE.
Vol. 15, no. 14,
by Maurice C. Shepard and George L. Calvy.
Jun 65, 8p Rept. no. MR005.09-1501.1.7
Proj. MR005 09, Task MR005 09 1501 1

Unclassified report

Pub. in New England Journal of Medicine v272 p848-51 Apr 22 1965.

Descriptors: (*Mycoplasma, Diseases), Pathology, Etiology, Agglutinins, Respiratory system, Urinary system.

The role of Mycoplasma (pleuropneumonia-like organisms) in human disease is reviewed and discussed. Continuing studies for more than two decades, initiated by the Commission on Acute Respiratory Diseases in World War II, extended by Eaton, Liu, et al., and resolved by Chanock and his associates, have established the Mycoplasma as true pathogens for human beings. Mycoplasma pneumoniae has been identified as the agent of cold-agglutinin-positive primary atypical pneumonia. Investigations in a different field of human disease - nongonococcal urethritis - give promise of selectively identifying still another member of the Mycoplasma group as a human pathogen. (Author)

AD-616 767 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
THE PROBLEM OF MIXED INFECTIONS IN PLAGUE,
by G. P. Aparin. Nov 63, 5p Trans-938
TT 65-62508

Unclassified report

Trans. of Irkutskii Gosudarstvennyi Nauchno-Issledovatelskii Protivochumnyi Institut Sibiri i Dalnego Vostoka. Izvestiya (USSR) v21 p178-80 1959.

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Descriptors: (*Pasteurella, Diseases), Infections, Bacteria, Etiology, Pasteurella pestis, Listeria, Sensitivity, Mice, USSR.

The infectiousness by various pathogenic organisms as a rule lowers the sensitivity of white mice to contamination by the plague microbe. This is testified to by the results of a computation of the LD50 and facts concerning the life duration of animals after infection.

AD-616 768 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
BIOLOGICAL AND CHEMICAL PROPERTIES OF THE GKI PEST ALLERGEN, REPT. I,
by M. D. Pryadkina, V. Yu. Gavrilenkova, and A. V. Lobanova. Nov 63, 11p Trans-937
TT 65-62509

Unclassified report

Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR) v40 n5 p72-7 1963.

Descriptors: (*Pasteurella pestis, Vaccines), (*Vaccines, Pasteurella pestis), Pasteurella, Diseases, Immunity, Antigens + antibodies, Antigen-antibody reactions, Polysaccharides, Proteins, Guinea pigs, Humans, USSR.

A fraction called GKI pest-allergen, was isolated from the extract of acetone dried plague microbes (EB strain) by precipitation with ammonium sulfide (40-60% saturation). This preparation injected intradermally in a dose of 0.01 mg provoked a positive reaction in immunized guinea pigs and caused no reaction in control nonimmune animals. The pest-allergen represents a protein-polysaccharide complex, in which the protein part is the specific allergen. Preliminary experiments staged on 50 volunteers demonstrated that the pest-allergen injected intradermally is harmless for man. Pest-allergen caused a marked allergic reaction in persons inoculated with the plague vaccine intradermally and repeatedly subjected to skin vaccination. (Author)

AD-616 769 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
A COMPARATIVE EVALUATION OF THE ACTION OF NOVEMBICHIN, HISTAMINE, AND CHICKEN YOLK ON THE DEVELOPMENT OF EXPERIMENTAL PLAGUE,
by V. N. Zulfyan and A. V. Noramiryan. Dec 63, 12p Trans-976
TT 65-62510

Unclassified report

Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR) v40 n5 p78-83 1963.

Descriptors: (*Pasteurella, Diseases), (*Pasteurella pestis, Sensitivity), Nitrogen mustards, Histamine, Eggs, Mice, Life span, Infections, Diagnosis, Immunity, USSR.

In single administration of novembichin and chicken yolk there was a considerable rise of the body sensitivity of albino mice to weakly virulent and avirulent Past. pestis strains; i.e., under the effect of the preparations mentioned the animals' life span was reduced more than two-fold and the possibility of isolating the Past. pestis culture increased 3-4 fold. The action of histamine in this respect was insignificant. Consequently, the administration of chicken egg yolk and novembichin may be successfully used for a more thorough investigation of the focus, detection of residual infectiousness and isolation of Past. pestis strains of low virulence. (Author)

AD-616 794 Div. 16/2

Georgia Univ., Athens. Dept. of Bacteriology.
PRELIMINARY ENZYMATIC EVENTS IN ASPARAGINE-DEPENDENT DENITRIFICATION BY PSEUDOMONAS PERFECTOMARINUS,
by Audrey N. Best and W. J. Payne. 4 Dec 64, 4p
Contract Nonr367701
Unclassified report

Pub. in Journal of Bacteriology v89 n4 p1051-4 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pseudomonas, Enzymes), Malic acid, Nicotinic acid, Amides, Adenine, Nucleotides, Phosphates, Oxidoreductases, Oxalacetic acid, Carboxylases, Carbon dioxide.

The initial events leading to denitrification by Pseudomonas perfectomarinus grown anaerobically in the presence of NO3(-) were investigated. Conversion of asparagine to malic acid was demonstrated. The nicotinamide adenine dinucleotide phosphate-linked malic acid dehydrogenase in this bacterium was shown to have a dependence for a divalent cation. A transhydrogenase was demonstrated. Oxaloacetic acid, a likely intermediate in conversion of malic to pyruvic acid, was rapidly decarboxylated by enzymes in cell-free extracts. The investigators were not able to show reversible formation of malic acid with oxaloacetic acid and reduced nicotinamide adenine dinucleotide phosphate, not of oxaloacetic acid with pyruvic acid and CO2. (Author)

AD-616 798 Div. 16/1

Army Medical Research Lab., Fort Knox, Ky.
REPEATED VERTICAL SEMICIRCULAR CANAL STIMULATION DOES NOT HABITUATE HORIZONTAL NYSTAGMUS IN CAT.
Reprint rept.,
by George H. Crampton and James H. Brown. 5 May 64, 12p Rept. no. 620
Proj. 3A012001B801, Task 01
Unclassified report

Pub. in Acta Oto-Laryngologica v58 p441-8 1965 (Copies available only to DDC users).

Descriptors: (*Semicircular canals, Acceleration tolerance), (*Acceleration tolerance, Semicircular canals), Stimulation, Stress (Physiology), Eye, Ear, Sensory mechanisms, Statistical analysis, Cats.

A group of cats was exposed to a series of angular accelerations about a vertical rotatory axis with the head tilted so that a synergic pair of vertical canals were in the plane of rotation. This group was compared with a second group that received only lateral canal stimulation, and with a third group that received neither lateral nor vertical canal stimulation. It was found that acceleration of the vertical canals does not reduce that nystagmus elicited with the lateral canals accelerated in the plane of rotation. (Author)

AD-616 799 Div. 16/15, 28/3

Army Medical Research Lab., Fort Knox, Ky.
MANGABEY x AND b WAVE ELECTRORETINOGRAM COMPONENTS: THEIR DARK-ADAPTED LUMINOSITY FUNCTIONS.
Reprint rept.,
by A. E. Jones, Martha C. Polson, and R. L. DeValois. Sep 64, 6p Rept. no. 619
Proj. 3A012001B801, Task 01 Unclassified report

Research done in cooperation with Dept. of Psychology, Indiana Univ., Bloomington, and supported in part by Public Health Service, Washington, D. C., under Grant PHS B2274
Pub. in Science v146 n3650 p1486-7 Dec 11 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Vision, Psychophysiology), (*Psychophysiology, Vision), Retina, Cornea, Adaptation(Physiology), Luminescence, Sensitivity, Visual perception, Monkeys.

The electroretinogram of the dark-adapted mangabey eye shows great temporal separation of the two major cornea positive potentials, the x and b waves. Luminosity functions determined from both deflections reveal that: (1) the x wave shows maximum sensitivity in the region of 550 millimicrons and corresponds closely to the human psychophysically determined photopic luminosity function; and (2) the b wave shows maximum sensitivity in the region of 500 millimicrons and corresponds to the psychophysically determined human scotopic luminosity function. (Author)

AD-616 807 Div. 16/15

Mental Health Research Inst., Univ. of Michigan, Ann Arbor.
INTERACTION OF FORWARD AND BACKWARD MASKING,
by Irwin Pollack. 1964, 5p
ESD TDR-63-636
Unclassified report

Pub. in The Journal of Auditory Research v4 p63-7 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Auditory perception, Noise), Auditory signals, Sounds, Hearing, Thresholds(Physiology).

The interaction of the 'forward masking' produced by a burst of noise upon a brief tone following the noise, with the 'backward masking' produced by a following noise burst was examined. Within the conditions tested, the combination of equally effective forward and backward masking conditions produced from 7 to 22 db additional masking relative to the components. The effectiveness of forward masking and of backward masking were largely independent each of the other. (Author)

AD-616 823 Div. 16/1, 16/12

Sao Paulo Univ. (Brazil).
ANATOMICAL AND PHYSIOLOGICAL BASES OF THE CONTROL OF SENSATIONS (Bases Anatomo-Fisiologicas del Control de las Sensaciones),
by Miguel R. Covian. 1962, 12p
Grant AF AFOSR62 335
Unclassified report

Pub. in Revista de Medicina del Estudio General de Navarra v6 n3 p217-27 Sep 1962
Text in Portugese, Summary in English.
(Copies available only to DDC users).

Descriptors: (*Sensation(Physiology), Nervous system), Sensory perception, Control, Physiology, End organs, Nerve impulses, Cerebral cortex, Anatomy, Brazil.

A study was made of the problem of the control of sensations. Considering that sensation signals in our consciousness the influence of internal and external environment, whereupon the organism reacts with a

movement, sensation appears as one step in a polisynaptic reflex. The study of its control is, therefore, the study of all those structures and neurophysiological mechanisms which have something to do with its origin. From this point of view a peripheral, a cortical and a subcortical control can be considered. The first is represented by the receptors organized specifically for one kind of stimulus: visual, auditory, tactile, etc. Consequently, there is a first control at the source of the sensation determined by a selection of the different stimuli. The nervous impulse originated in the receptor travels by specific pathway to the cerebral cortex where it projects on specific areas named 'primaries areas of projection'. On these areas the impulse gives rise to a change in the electrical cortical activity known as the cortical evoked potential. These primaries areas are essential for the conscious phenomenon called sensation. Tactile and proprioceptive sensibility projects to the same neuronal population in somatic area 1, but there are specific neurons for the following kind of stimuli: movement of hairs, pressure upon the skin and mechanical deformation of deep tissues. These achievements together with others found in different modalities of sensation give good evidence of the existence of one anatomical and physiological background of sensation at neuronal level.

AD-616 836 Div. 16/2, 16/3

National Research Council of Canada, Ottawa (Ontario). Div. of Biosciences.
PROTEASE PRODUCTION BY ASPERGILLUS FUMIGATUS,
by A. G. Jonsson and S. M. Martin. 6 Apr 64, 6p
Rept. no. NRC-8224
Unclassified report

Pub. in Agricultural and Biological Chemistry (Tokyo) v28 n10 p734-9 1964 (Copies available only to DDC users).

Descriptors: (*Fungi, Peptide hydrolases), (*Peptide hydrolases, Fungi), Culture media, Molds(Organisms), Ph, Enzymes.

The five strains of A. fumigatus examined showed marked variation in their ability to produce protease in submerged culture. Also marked differences in protease production were observed when individual strains were tested in different media. Yields of up to 3.7 EUph 10.0 per 1 were obtained in a liver-glucose medium with the one pathogenic strain included in the study. (Author)

AD-616 839 Div. 16/10

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
AN AQUEOUS OIL RED O FIXATIVE STAIN FOR HISTOLOGICAL PREPARATIONS.
Final rept. for Feb-Jun 64,
by Duncan E. McVean, Roman L. Patrick, and Charles E. Witchett. 20 Jul 64, 5p AMRL TR-64-142
Proj. 6302, Task 630206
Unclassified report

Pub. in American Journal of Clinical Pathology v43 n3 p291-3 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Histological techniques, Lipids), Tissues(Biology), Surface-active substances, Toxicity, Hydrazine, Pathology.

A water-soluble oil red O lipid stain, containing buffered formalin, is described, wherein staining and fixation of sections of fresh tissue can be performed in 1 step. Neither pretreatment nor differentiation with alcohol solutions is required. Counter-stains such as hematoxylin can be used in conjunction with the lipid stain. Small quantities of lipid have been demonstrated in tissue sections in which conventional oil red O solutions failed to reveal any lipid. The water-soluble oil red O lipid stain can be used satisfactorily only in fresh, unfixed tissue. (Author)

AD-616 850 Div. 29/6, 25/1, 1/2
CFSTI Prices: HC$1.00 MF$0.50

Air Materiel Command, Wright-Patterson AFB, Ohio. Engineering Div.
DEVELOPMENT OF SUB-STRATOSPHERE PRESSURE SUITS IN THE GERMAN AIR FORCE.
Memorandum rept.,
by Verner J. Wulff and W. Randolph Lovelace.
11 Aug 45, 16p Serial no. TSEAL-3-660-48-M
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Pressure suits, High altitude), Pressurized cabins, Flight, Gliders.

A translation is given or a summary of the development of pressure suits at the Draegerwerke, Luebeck, Germany, during World War II under contracts with the German Air Force. The German Air Force sponsored the development of heavy sub-stratosphere pressure suits but was primarily interested in the use of pressure cabins. It was interested in the development of a light-weight automatic operating, non-interfering pressure suit for use as an emergency device in case of cabin pressure loss at high altitudes.

AD-616 852 Div. 16/1
CFSTI Prices: HC$1.00 MF$0.50

Harvard Univ., Cambridge, Mass.
THE COMPARATIVE PHYSIOLOGY OF SENSORY MECHANISMS OF ORIENTATION.
Final rept. for Jan 56-Jun 65,
by D. R. Griffin. 1 Jun 65, 4p
Contract Nonr186612
Unclassified report

Continuation of Contracts N6onr09, N5ori07659.

Descriptors: (*Sensory mechanisms, Bats), (*Bats, Echo ranging), Physiology, Nervous system, Sound, Reports.

AD-616 933 Div. 16/3

Army Medical Research and Nutrition Lab., Denver, Colo.
INTERRELATIONSHIP OF KETONE BODY METABOLISM AND GLUCOSE UTILIZATION BY ADIPOSE TISSUE IN VITRO,
by Richard W. Hanson. 14 Aug 64, 6p
Unclassified report

Pub. in Archives of Biochemistry and Biophysics v109 n1 p98-103 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ketones, Metabolism), (*Glucose, Metabolism), Adipose tissue, Oxidation, Acetates, Insulin, Carbon dioxide, Fats, Fatty acids, Glycogen, Pentoses, Synthesis, Mice.

The oxidation of acetoacetate-3-C14 by mouse epididymal fat pads and its effect on the pattern of glucose metabolism was studied. Glucose and insulin did not change the rate of acetoacetate oxidation, but the ketone body in the presence of insulin altered the pattern of glucose utilization. Carbon dioxide output, and fatty acid and glycogen synthesis were enhanced, while glyceride-glycerol formation was decreased. This reduced glyceride-glycerol synthesis was reflected in lowered triglyceride synthesis from palmitate. C-1/C-6 ratio experiments showed acetoacetate to increase C14O2 production from glucose-1-C14 in the presence of insulin, suggesting a stimulation of pentose pathway activity. (Author)

AD-616 934 Div. 16/3, 16/1

Presbyterian-St. Luke's Hospital, Chicago, Ill.
INTERACTION OF BOVINE AUTOPROTHROMBIN C WITH PHOSPHOLIPIDS AND DIVALENT CATIONS,
by Edmond R. Cole, J. L. Koppel, and John H. Olwin.
29 Jun 64, 9p
Contract DA49 193md2171; Grant NIH HE03940 06
Unclassified report

Pub. in Canadian Journal of Biochemistry v42 p1595-1603 1964 (Copies available only to DDC users).

Descriptors: (*Blood coagulation, Complex compounds), (*Prothrombin, Complex compounds), (*Phospholipids, Blood coagulation), Enzymes, Calcium, Strontium, Ions, Coenzymes, Purification, Blood platelets.

A thromboplastic enzyme, autoprothrombin C, can be complexed to different phospholipids and removed from solution in the form of such complexes. A technique for dissociating these complexes was developed, resulting in the recovery of the thromboplastic enzyme essentially free of phospholipid and in a higher degree of purity. Calcium ions are required for the formation of the complex, but strontium can replace calcium not only as the metal ion in the phospholipid-complexing system, but also as an autoprothrombin C cofactor in a prothrombin activation mixture. Magnesium was not effective in either system. The role of different phospholipids in the complexing phenomenon was studied and compared with the suitability of the same phospholipids as prothrombin-activating cofactors of autoprothrombin C. All phospholipid preparations studied complexed with autoprothrombin C to some degree, but the most efficient complexing agents were found to be asolectin and a commercial phosphatidyl ethanolamine preparation, both materials being among the ones which demonstrated the highest prothrombin conversion activity. Since thrombin was not complexed under the same conditions, autoprothrombin C could be isolated from commercial thrombin preparations also containing autoprothrombin C. (Author)

AD-616 935 Div. 16/13

Presbyterian-St. Luke's Hospital, Chicago, Ill.
BLEEDING TENDENCIES IN THE SURGICAL PATIENT: THEIR DETECTION AND CORRECTION,
by John H. Olwin and J. L. Koppel. 1963, 10p
Contract DA49 193MD2171; Grant NIH HE05964 02S1
Unclassified report

Pub. in Surgical Clinics of North America v44 n1 p185-94 Feb 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Surgery, Hemorrhage), (*Hemorrhage, Blood disorders), Blood coagulation, Diseases, Blood vessels, Anticoagulants, Blood transfusions, Blood plasma, Pathology, Diagnosis, Therapy.

Abnormal bleeding in the surgical patient is caused by defects in one or more coagulation factors combined, in some instances, with vascular abnormalities. Other conditions which may be encountered occasionally, but which are not restricted to one single phase of clotting are hyperheparinoid states and the presence of circulating anticoagulants other than heparin. In the various sections devoted to the discussion of these factor deficiencies, suggestions are made as to methods for detecting individual deficiencies and for neutralizing the effects brought about by the abnormal states.

AD-616 937 Div. 16/9, 16/10, 16/3

Army Medical Research and Nutrition Lab., Denver, Colo.
THE EFFECTS OF CHOLINE ON HEPATIC ULTRASTRUCTURAL CHANGES ASSOCIATED WITH THE INTRAVENOUS ADMINISTRATION OF FAT,
by N. W. King, L. D. Jones, H. Sasaki, and F. Schaffner. 1965, 10p
Unclassified report

Pub. in American Journal of Clinical Nutrition v16 n1 p88-96 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cholines, Deficiency diseases), (*Deficiency diseases, Fats), (*Liver, Morphology (Biology)), Colloids, Parenteral infusions, Nutrition, Diet, Enzymes, Metabolism, Lipids, Cells(Biology), Reticulo-endothelial system, Histological techniques, Rats.

The administration of intravenous fat emulsion to rats produces dilatation of the hepatic rough endoplasmic reticulum similar to that which occurs in choline deficiency. In the present study the changes occurring in the livers of rats receiving multiple injections of an intravenous fat emulsion while maintained on choline-deficient, choline-rich and stock diets were determined by light and electron microscopy. Severe fatty metamorphosis of the liver developed in all rats on choline-deficient diets. This fatty change was increased by intravenous injection of Intralipid. Dilatation of the hepatic rough endoplasmic reticulum was produced in rats on a stock diet given injections of Intralipid, as well as in rats on choline-deficient diets, rats on choline-deficient diets given injections of Intralipid and in rats on choline-rich diets given injections of Intralipid. Dilatation of the rough endoplasmic reticulum associated with the intravenous administration of Intralipid was not prevented by dietary supplementation with choline. This indicates that the mechanism by which Intralipid produces dilatation of the hepatic rough endoplasmic reticulum is more complex than simply the production of a relative choline deficiency. A possible explanation for dilatation of the rough endoplasmic reticulum is presented on the hypothesis that rough endoplasmic reticulum undergoes morphologic and quantitative enzymatic change to become smooth endoplasmic reticulum. This is thought to be a compensatory phenomenon of the hepatocyte to metabolize the increased intracellular lipid. (Author)

AD-616 938 Div. 16/9, 16/11, 16/10, 16/3

Army Medical Research and Nutrition Lab., Denver, Colo.
TOXICITY TESTING OF FAT EMULSIONS FOR INTRAVENOUS ADMINISTRATION,
by L. D. Jones, M. W. Castleberry, J. E. Canham, and N. W. King. 1965, 6p
Unclassified report

Pub. in American Journal of Clinical Nutrition v16 n1 p62-7 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Fats, Parenteral infusions), (*Parenteral infusions, Fats), (*Toxicity, Fats), Colloids, Histological techniques, Body weight, Blood analysis, Urine, Liver, Spleen, Pathology, Rats.

Clinical and histopathologic toxicity studies were conducted on fourteen fat emulsions including Lipomul, Intralipid, Lipofundin and cottonseed or soybean oil emulsions prepared commercially or experimentally for intravenous use. These emulsions were administered to rabbits and/or rats in a daily dose of 2.0 to 3.0 gm. of fat per kg. of body weight. Clinical studies included observation of the animals' general reaction to the infusion, local reaction at the site of injection, variation in body weight, and weekly hemograms and urinalyses. The animals were sacrificed at least ten days after infusion and a detailed necropsy was performed. No gross lesions could be attributed to the fat emulsion. However, histopathologic examination revealed the deposition of intravenous fat pigment in the liver and spleen of every animal. The most pigment was found in animals given cottonseed oil emulsions and the least in animals given emulsion SR-151. Lipoid granulomas were observed in all test animals except those given emulsion SR-141. Mild hepatic fibrosis was observed in animals receiving Lipofundin. Adverse clinical reactions in rabbits included death in two animals, produced by Lipofundin K399, and hyperpyrexia, anorexia, decreased water intake, weight loss, and decrease in hemoglobin and hematocrit following infusion. The best performance in rabbits was obtained with Intralipid 293011 and in rats with SR-4734-107A. Although Lipofundin was well tolerated by rats, in general, soybean oil-egg yolk phosphatide-glycerol type emulsions produced the least adverse physiologic and histopathologic changes in the test animals. (Author)

AD-616 944 Div. 16/8, 16/10, 24/2

Army Medical Research and Nutrition Lab., Denver, Colo.
SIMPLE TECHNIQUE FOR THE PROJECTION OF STAINED TISSUE SECTIONS,
by Dean C. Fry and Richard J. Cottrell. Sep 63, 4p
Unclassified report

Pub. in American Journal of Medical Technology p41-4 Jan-Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Histological techniques, Still projectors), Training devices, Medical personnel, Tissues(Biology).

A simple technique was developed for the classroom projection of stained tissue sections. The report describes the techniques used in the preparation of the projection slides. (Author)

AD-616 945 Div. 16/9

Army Medical Research and Nutrition Lab., Denver, Colo.
THIAMINE REQUIREMENT IN THE ADULT HUMAN AS MEASURED BY URINARY EXCRETION OF THIAMINE METABOLITES,
by Z. Z. Ziporin, W. T. Nunes, R. C. Powell, P. P. Waring, and H. E. Sauberlich. 31 Aug 64, 8p
Unclassified report

Pub. in Journal of Nutrition v85 n3 p297-304 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Thiamines, Nutrition), (*Nutrition, Thiamines), (*Metabolism, Thiamines), Adults, Urine, Excretion, Diet, Deficiency diseases.

Normal, healthy young men consumed a diet with a restricted intake of thiamine. Urinary excretion of thiamine, as well as the pyrimidine and thiazole moieties of thiamine, were measured. After 6 days of thiamine deprivation, the urinary thiamine excretion decreased to an average of 14 micrograms/24 hours. By the eighteenth day of deprivation, there was no detectable thiamine in the urine. Metabolite excretion increased during the depletion period and appeared to reach a constant level. It is proposed that this level of metabolite output represents a measure of the rate at which body stores of thiamine are being depleted. The maintenance of thiamine balance would require the amount that would replace the vitamin used for metabolic needs, and would represent the minimum daily requirement. The metabolite excretion from the eighteenth to the thirtieth day of depletion, when no thiamine was being excreted, averaged 903 micrograms/24 hours. However, the maximal amount excreted in any one day during this period was 913 micrograms/day. Two methods for calculating the thiamine requirement are possible: (1) subtracting the 160 micrograms of ingested thiamine from the metabolite output, leaving a net deficit of 753 micrograms of thiamine/day; this would make the minimum daily requirement 0.27 mg/1000 kcal; and (2) not subtracting the amount of ingested thiamine from the metabolite output, leaving a net deficit of 913 micrograms of thiamine/day. The minimum daily requirement would then be 0.33 mg/1000 kcal. Using a safety factor, the recommended daily allowance should be 0.54 to 0.66 mg/1000 kcal. This is in good agreement with previous work which correlated clinical symptoms with the available biochemical tests. (Author)

AD-616 946 Div. 16/9

Army Medical Research and Nutrition Lab., Denver, Colo.
EXCRETION OF THIAMINE AND ITS METABOLITES IN THE URINE OF YOUNG ADULT MALES RECEIVING RESTRICTED INTAKES OF THE VITAMIN,
by Z. Z. Ziporin, W. T. Nunes, R. C. Powell, P. P. Waring, and H. E. Sauberlich. 31 Aug 64, 10p
Unclassified report

Pub. in Journal of Nutrition v85 n3 p287-96 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Thiamines, Excretion), (*Deficiency diseases, Thiamines), (*Nutrition, Thiamines), (*Metabolism, Thiamines), Diet, Fats, Carbohydrates, Proteins, Urine, Pyrimidines, Thiazoles, Cholesterol, Fatty acids, Phospholipids, Hematocrit, Enzymes.

Eight young men consuming a 2800-kcal diet consisting of 80 g protein, 100 g fat and 400 g carbohydrate and providing 0.11 to 0.18 mg thiamine/day, developed clinical symptoms of thiamine deficiency in 9 to 27 days. Thiamine excreted in the urine decreased to less than 50 micrograms/day at the sixth day to the undetectable levels by the eighteenth day of depletion. Low-level repletion (0.54 to 0.61 micrograms/day) for 12 days failed to produce detectable levels of thiamine in the urine. Red blood cell transketolase activity declined with progressive thiamine deficiency and returned to normal levels with low-level repletion. The excretion of the pyrimidine and thiazole moieties of thiamine as metabolites of the vitamin appeared to increase above the levels found with the use of a diet with sufficient thiamine (about 2 mg/day), and was reduced to control levels following low-level repletion. The pyrimidine moiety in the deficient individual appears to be further catabolized. There appears to be a body store of thiamine which is utilized during a period of deficient intake. Serum cholesterol, nonesterified fatty acids, blood phospholipids, creatinine and hematocrit did not change appreciably during thiamine deficiency. The biochemical pattern for thiamine deficiency in human adults is described. (Author)

AD-616 947 Div. 16/3, 16/10

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
FATTY ACID FLUX AND TRIGLYCERIDE SECRETION IN THE HYDRAZINE-INDUCED FATTY LIVER,
by J. S. Amenta and A. M. Dominguez. 10 Jun 64, 21p
Proj. 6X99 26 001 09
Unclassified report

Pub. in Experimental and Molecular Pathology v4 p282-302 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrazine, Fatty acids), (*Fatty acids, Hydrazine), (*Metabolism, Hydrazine), Secretion, Esters, Lipids, Phospholipids, Blood plasma, Synthesis, Tracer studies, Liver, Pathology.

Based on the observations in the study, the hypothesis is presented that approximately half of the lipid accumulation in the liver of the hydrazine-treated rat is a result of (a) increased plasms NEFA (nonesterized fatty acids) into the liver cell, (b) increased TG (triglyceride) synthesis from this excess NEFA, and (c) a small decrease in TG secretion shortly after hydrazine injection. Triglyceride transport into the liver does not appear to be a significant factor. Changes in other metabolic pathways may account for the remaining 50% of the total TG accumulation in the liver. (Author)

AD-616 948 Div. 16/10

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
COLOBOMA OF THE OPTIC DISK MISTAKEN CLINICALLY FOR RETINOBLASTOMA,
by Sadi de Buen and Robert H. Fenton. 1965, 7p
Unclassified report

Pub. in Survey of Opthalmology v10 n1 p7-14 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Eye, Pathology), Ophthalmology, Retina Neoplasms, Optic nerve, Anomalies, Diagnosis, Histology, Tissues(Biology), Histological techniques.

A case is presented of congenital coloboma of the optic disk and adjacent structures in which the defect was interpreted ophthalmoscopically as a retinoblastoma. The absence of uveal and retinal pigment in the malformed tissues produced a leukokoria, while the irregularity of the surface of the lesion was responsible for the ophthalmoscopic appearance of an elevated 'tumor mass.' An optical explanation for the disagreement between the clinical diagnosis and the histopathologic findings is presented. (Author)

AD-616 949 Div. 16/11, 16/10

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
THE EFFECTS OF PHENACETIN AND ITS CONTAMINANT ON THE KIDNEY OF THE RAT,
by Bertram Schnitzer, Edward B. Smith, and Abner Golden. 20 Jan 65, 11p
Grant DASA03 101 Unclassified report

Pub. in Americal Journal of Pathology v46 n6 p917-27 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Analgesics + antipyretics, Kidneys), Pharmacology, Drugs, Contamination, Hemolysis, Erythrocytes, Spleen, Diseases, Pathology, Rats.

The effects of phenacetin (acetophenetidin) and the contaminant present in phenacetin, acetic-4-chloranilide (A4CA), were observed in young male Osborne-Mendel rats fed diets of these drugs for 22 weeks. The results suggest that the principal offending agent producing the changes observed is not phenacetin but is the contaminant A4CA. There was evidence of a hemolytic process, Heinz bodies appeared in red cells and there were sulfhemoglobinemia, prominent splenic enlargement, an increase of hemosiderin in the spleen, and hemosiderin and hemosiderin-negative pigment in the renal tubular epithelium and in Kupffer cells. The treated animals showed no evidence of interstitial nephritis or necrosis of the renal papillae, both of which may be associated with excessive and prolonged ingestion of phenacetin-containing analgesic agents in human subjects. (Author)

AD-616 950 Div. 16/10

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
MALACOPLAKIA OF THE URINARY TRACT, A STUDY OF TWENTY-FOUR CASES,
by Bruce H. Smith. 24 Jul 64, 9p
Unclassified report

Pub. in American Journal of Clinical Pathology v43 p409-17 May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Urinary system, Pathology), Histology, Granules, Glycoproteins, Mucopolysaccharides, Calcification, Histological techniques, Etiology.

Twenty-four cases of malacoplakia of the urinary tract in the files of the Armed Forces Institute of Pathology have been reviewed. Twenty-one of these cases had not been reported previously, and, when added to those in the literature, brought the total to 94. In this series, malacoplakia is a persistent lesion of undetermined cause that affects women more frequently than men and may cause or contribute to the death of patients by involving the upper urinary tract. Grossly, the lesions were predominantly raised, granular, and firm, and only 25 per cent conformed to the classic plaque-like description. Histologically, the condition may pass through 3 phases. It can be readily recognized in the classic granulomatous phase by its production of calcospherules, which apparently originate as intracellular granules composed of a glycoprotein linked with mucopolysaccharides, and ultimately are calcified. Study of these cases failed to disclose the etiology of this condition.

AD-616 951 Div. 16/3

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
DIPHOSPHYPYRIDINE NUCLEOTIDE-SYNTHESIZING ENZYME IN THE LIVER,
by Wallace A. Jones and Vaman S. Waravdekar. 24 Dec 64, 12p
Unclassified report

Pub. in Laboratory Investigation v14 n4 p397-408 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Histological techniques, Liver), (*Liver, Enzymes), (*Enzymes, Biosynthesis), Organic phosphorus compounds, Pyridines, Nucleotides, Phosphorylation, Nicotinic acid, Amides, Adenosine phosphates, Glutamic acid, Oxidoreductases, Tissues-(Biology).

A histochemical method has been devised for the demonstration of diphosphopyridine nucleotide (DPN)

pyrophosphorylase activity using nitro-blue tetrazolium as the histochemical indicator. The procedure is based upon the enzymatically catalyzed synthesis of DPN from nicotinamide mononucleotide and adenosine triphosphate with the formation of reduced diphosphopyridine nucleotide at the site of DPN synthesis. The latter is accomplished by providing glutamate and glutamic dehydrogenase in the incubating medium. DPN pyrophosphorylase activity is greatest in central lobular zones of the liver, and there is greater activity of this enzyme in the liver than in other viscera studied. (Author)

AD-616 952 Div. 29/6

Air Force Systems Command, Washington, D. C.
WILEY POST: FIRST TEST OF HIGH ALTITUDE PRESSURE SUITS IN THE UNITED STATES.
Historical note,
by Charles L. Wilson. 14 Sep 64, 6p
Unclassified report

Pub. in Arch Environ Health v10 p805-10 May 1965 (Copies available from author; Hq AFSC (SCTB) U.S.A.F. Andrews Air Force Base, Washington, D. C., 20331).

Descriptors: (*Pressure suits, Tests), High altitude, Aviation personnel, United States, Design, Textiles, Rubber coatings, Flight testing, Liquefied gases, Oxygen, History.

Three different high altitude suits were designed and tested for Wiley Post. The report contains a photograph of each of these three suits. Two low pressure chamber tests were conducted using the final suit. These represent the first United States tests of a human subject in a high altitude pressure suit at low barometric pressures. Post employed his suit on at least ten and possibly 17 flights and used liquid oxygen on all such flights.

AD-616 953 Div. 16/12, 16/10

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
A HISTOCHEMICAL STUDY OF OXIDATIVE ENZYMES IN THE NERVOUS SYSTEM OF VITAMIN E-DEFICIENT RATS,
by Stirling Carpenter. 1965, 6p
Unclassified report

Pub. in Neurology v15 n4 p328-332 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Enzymes, Nervous system), (*Nervous system, Deficiency diseases), (*Vitamin E, Deficiency diseases), Histological techniques, Oxidoreductases, Brain, Spinal cord, Succinates, Mitochondria, Nerve cells, Ganglia, Pathology, Rats.

The swollen axons which are seen in sensory relay nuclei of brainstem and spinal cord of vitamin E-deficient rats show marked activity of oxidative enzymes with the exception of succinic dehydrogenase. It is suggested that the mitochondria which accumulate in the swollen axons are deficient in their ability to utilize succinate. The affected axons come from cells in dorsal root ganglia whose perikarya show normal enzyme activity.

AD-616 954 Div. 16/10

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
UMBILICAL GRANULOMAS, PILONIDAL DISEASE, AND THE URACHUS,
by Willard D. Steck and Elson B. Helwig. 1965, 15p
Unclassified report

Pub. in Surgery, Gynecology and Obstetrics v120 p1043-57 May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Embryology, Anomalies), (*Abdomen, Pathology), (*Urinary system, Neoplasms), Ligaments, Histological techniques, Infants, Adults, Anatomy, Urine, Secretion, Diseases, Mucopolysaccharides, Infections, Hair, Therapy.

The urachus is normally a short, fibromuscular, suspensory ligament for the bladder apex. It extends to the umbilicus in the newborn but not in normal adults. Its persistent attachment to the umbilicus may result rarely in a patent urachus through which urine may pass, in an external urachal sinus, or more commonly in an abnormally deep umbilical depression. The urachus was attached to the umbilicus in 48 of 290 patients with significant umbilical disease. Three were patent, and 4 coexisted with omplalomesenteric duct anomalies. Forty instances of attached urachus were found among 82 of the patients who had chronic granulomatous omphalitis. Granulomatous omphalitis is a potentially serious disease of young adult Caucasian males who have deep navels. Pilonidal granuloma accounted for the disease in a large number of these patients. This study proposes a cause and effect relationship between urachal anomaly and serious omphalitis. (Author)

AD-616 955 Div. 16/10, 16/2

Armed Forces Inst. of Pathology, Army Medical Center, Washington, D. C.
THE HISTOPATHOLOGY AND HISTOCHEMISTRY OF ERYTHEMA NODOSUM LEPROSUM,
by Mario C. Mabalay, Elson B. Helwig, Jose G. Tolentino, and Chapman H. Binford.
30 Dec 64, 22p
Grants PHS E199, PHS5T1A1 220
Unclassified report

Pub. in International Journal of Leprosy v33 n1 p28-49 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mycobacterium leprae, Diseases), Pathology, Histological techniques, Cells(Biology), Connective tissue, Blood vessels, Morphology(Biology), Leukocytes, Lymphocytes, Edema, Therapy, Philippines.

The study was undertaken to provide additional information on the nature of erythema nodosum leprosum by histochemical and histopathologic methods, and to compare the changes taking place in early lesions with those in subsiding ones. In an attempt to explain some features of ENL in its early and late stages, attention was focused on the following points: (a) localization of the lesion; (b) cellular composition of the inflammatory infiltrate; (c) alterations in the ground substance; (d) specific changes in the connective tissue stroma (collagen, elastic tissue, and reticulum), and (e) changes occurring in the blood vessels. (Author)

AD-616 960 Div. 16/1

Frost Engineering Development Corp., Denver, Colo.
OPTIMIZATIONS OF HUMAN RESTRAINT SYSTEMS FOR SHORT-PERIOD ACCELERATION.
Final rept. for Oct 62-Aug 63,
by Peter R. Payne. 26 Sep 63, 17p
Contract AF33 657 9514, Proj. 6301, Task 630102
AMRL tr-65-108 Unclassified report

Pub. in American Society of Mechanical Engineers paper no. 63-WA-277 p1-15 1964 (Copies not available to DDC or Clearinghouse customers). Prepared for presentation at the Winter Annual Meeting, Philadelphia, Pa., November 17-22, 1963, of the American Society of Mechanical Engineers.

Descriptors: (*Acceleration, Safety harness), (*Safety harness, Optimization), Acceleration tolerance, Attenuation, Dynamics, Humans, Analog computers, Analysis, Impact shock.

A restraint system's main function is to restrain its occupant when his vehicle is subjected to acceleration. If the restraint system is rigid and well-fitting (to eliminate slack) then it will transmit the vehicle acceleration to its occupant without modifying it in any way. Few present-day restraint systems are stiff enough to give this one-to-one transmission characteristic, and depending upon their dynamic characteristics and the nature of the vehicle's acceleration-time history, they will either magnify or attenuate the acceleration. Obviously an optimum restraint system will give maximum attenuation of an input acceleration. In the general case of an arbitrary acceleration input, a computer must be used to determine the optimum dynamic characteristics for the restraint system. Analytical solutions can be obtained for certain simple cases, however, and these cases are considered in the paper, after the concept of dynamic models of the human body is introduced. The paper concludes with a description of an analog computer specially developed for the Air Force to handle completely general mechanical restraint optimization programs of this type, where the acceleration input may be any arbitrary function of time. (Author)

AD-616 961 Div. 16/11, 16/3

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
EFFECTS OF SODIUM LACTATE ON OXYGEN TOXICITY IN THE RAT,
by Philip Felig and William L. Lee, Jr.
1964, 9p Rept. no. AMRL TR-65-95
Contract NASA R87, Proj. 7164, Task 716404
Unclassified report

Pub. in Annals of the New York Academy of Sciences v118 art16 p829-35 Mar 24 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oxygen consumption, Toxicity), (*Sodium compounds, Oxygen consumption), Lactates, Carbon dioxide, Pressure breathing, Enzymes, Endocrine glands, Adaptation(Physiology), Pyruvates, Acetates, Lactic acid, Buffers, Pyridines, Nucleotides.

The toxic manifestations of prolonged exposure to oxygen at a partial pressure of one atmosphere and above have been described for a wide variety of experimental animals. Less certainty, however, is found in the literature concerning the actual mechanism of toxicity. Changes in carbon dioxide transport, endocrine response, and enzyme activity have all been implicated though none has gained universal acceptance. One approach to the problem of toxic mechanisms involves an investigation of factors modifying the organism's response to the noxious effect of oxygen. Recently Matteo and Nahas reported increased survival in oxygen-exposed rodents treated with sodium bicarbonate. This work suggested to us that other alkalinizing salts might have a similar protective role. The present study was consequently designed to evaluate the therapeutic efficacy of sodium lactate, sodium pyruvate, and sodium acetate, agents whose physiologic buffering capacity, unlike that of bicarbonate, depends in large part upon oxidation of a metabolizable anion. The effects of these agents are of particular interest in view of previous reports suggesting both an interference with electron transport as well as an accumulation of lactic acid upon exposure to an oxygen enriched environment. In addition, since previous studies with buffers have involved daily removal of animals to room air for injections, the effects of sodium bicarbonate and tris (hydroxymethyl) aminomethane (THAM) were re-evaluated with a continuous exposure technique. (Author)

AD-616 967 Div. 16/3

Walter Reed Army Inst. of Research, Washington, D. C.
ELECTROPHORETIC AND IMMUNOELECTROPHORETIC CHARACTERIZATION OF SOLUBLE CELLULAR PROTEINS IN RAT LIVER CELL SAP,
by Tatsuo Hase and Dorsey T. Mahin. 22 Jun 64, 6p
Unclassified report

Pub. in The Journal of Immunology v94 n2 p191-6 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Liver, Cells(Biology)), (*Proteins, Liver), Electrophoresis, Cytoplasm, Blood proteins, Antigens + antibodies, Osmotic pressure, Immunology, Synthesis.

Soluble protein composition of the cytoplasmic sap of the hepatic cells in rats was analyzed by electrophoretic and immunoelectrophoretic techniques. The electrophoretic pattern of hepatic cytoplasmic sap at a particular time of day was relatively constant if daily activity of rats was regulated. The majority of cytoplasmic sap proteins in rat liver differed from serum proteins in electrophoretic and immunoelectrophoretic properties. Cytoplasmic sap proteins proper could be grouped into at least six components having discrete electrophoretic and antigenic properties. From the findings, it is suggested that intracellular colloidal osmotic pressure is maintained primarily by proteins that differ from those found in body fluid. Almost complete absence of serum proteins in the hepatic cells also indicates that serum proteins leave cells rapidly after synthesis. (Author)

AD-616 970 Div. 16/2

Naval Medical Research Unit No. 4, Great Lakes, Ill.
A SELECTIVE MEDIUM AND COLOR TEST FOR MYCOPLASMA PNEUMONIAE,
by William H. Kraybill and York E. Crawford.
30 Nov 64, 6p
Proj. MR005 09 1305
Unclassified report

Pub. in Proceedings of the Society for Experimental Biology and Medicine v118 p965-70 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mycoplasma, Culture media), Growth, Methylene blue, Chlorides, Antimetabolites, Identification.

Two common laboratory compounds, methylene blue chloride (MB) and 2,3,5-triphenyltetrazolium chloride (TTC), were studied for their reactivity with or against human strain mycoplasma. Addition of 0.002% of MB to PPLO agar converts it to a medium which is highly selective for Mycoplasma pneumoniae. This modification is recommended for epidemiological surveys, for purification of cultures, and even for identification of M. pneumoniae. A test based on a color reaction between M. pneumoniae and TTC has been described. This test is recommended for confirming or establishing the identity of this species from other mycoplasma of the human respiratory tract. (Author)

AD-616 971 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
CONCERNING THE SENSITIVITY AND SPECIFICITY OF THE ANTIBODY NEUTRALIZATION REACTION IN PLAGUE AND TULAREMIA.
Rept. 8 of Serological Investigations in Plague,
by M. I. Levi, L. A. Sagatovskaya, Yu. G. Suchkov, and A. G. Momot. Nov 63, 8p Trans-951
TT 65-62512

Unclassified report

Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR) v40 n5 p65-8 1963.

Descriptors: (*Pasteurella, Antigen-antibody reactions), (*Antigen-antibody reactions, Pasteurella), Antigens + antibodies, Diseases, Erythrocytes, Immunity, Immune serums, Sensitivity, Synthesis, USSR.

The antibody neutralization reaction, based on phenomenon of depression of passive hemaggultination with the use of formalinized sheep erythrocytes possessed a high sensitivity and specificity. The mentioned reaction permits easy differentiation of the plague causative agent from that of pseudotuberculosis. (Author)

AD-616 972 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
FROM THE DIARY OF A PHYSICIAN WHO SUSTAINED EXPERIMENTAL PLAGUE,
by V. P. Smirnov. Nov 63, 8p Trans-952
TT 65-62513

Unclassified report

Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR) v40 n5 p68-72 1963.

Descriptors: (*Pasteurella pestis, Vaccines), (*Vaccines, Pasteurella pestis), Immunity, Infections, Medical personnel, Epidemiology, USSR.

Experiments were staged on 1240 guinea pigs. Subcutaneous, skin, conjunctival and combined (simultaneous subcutaneous and conjunctival) methods of vaccination with the EB Past. pestis strain were compared. The conjunctival and combined methods proved to be the best. On this basis the doctor vaccinated himself by the combined method and 15 days later infected himself by rubbing the organ tissue of a guinea pig which perished from plague into the scarified skin of the leg. In 5 days a scab was removed from the site of infection under which a plague ulcer had formed. On the 7th day temperature rose up to 38.6C and remained high for 36 hours. On the 8th day a regional bubo formed with characteristic tenderness. Material for seeding and guinea pig inoculation was periodically obtained from the ulcer. Seven standard plague strains were isolated from the ulcer and one from the guinea pig in 6, 7, 8 and 9 days. The blood, sputum, and urine cultures were negative. All the strains isolated retained their initial properties including virulence. The results of observations led to a conclusion that subcutaneous-conjunctival vaccination provided an adequate resistance to Past. pestis and therefore could be recommended for vaccination of the population. (Author)

AD-616 973 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
INFECTIOUS ALLERGY,
by A. T. Kravchenko. Nov 63, 6p Trans-959
TT 65-62514

Unclassified report

Trans. of Byulleten Eksperimentalnoi Biologii i Meditsiny (USSR) v23 n2 p83-6 1947.

Descriptors: (*Allergy, Antigens + antibodies), Infectious diseases, Toxins + antitoxins, Antigen-antibody reactions, Etiology, Bacteria, Sensitivity, Animals, Immunity, Immune serums, Therapy, USSR.

An external similarity exists between a condition of sensitization stipulated by the introduction of the protein antigen and the condition of infectious allergy caused by the introduction of the etiological agents of some infectious diseases (tuberculosis, brucellosis, glanders, tularemia and intoxication by exotoxins). These two conditions of the same cells are principally different from each other in their nature and mechanism. The role of infectious allergy of cells in the development of the infectious process and immunity still has not been sufficiently elucidated. It is already clear that the therapeutic effect of serum therapy depends on the nature of the reaction of cells from internal organs to the bacterial toxin. If the cells of internal organs of an animal are in a state of infectious allergy to the bacterial toxin, the introduction of specific serum does not change the course of the intoxication process. (Author)

AD-616 974 Div. 16/4
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
POWERY MILDEW ON BROOM RAPE (OROBANCHE),
by G. V. Poletaeva, V. N. Greshnova, O. B. Natalina. Dec 63, 4p Trans-977
TT 65-62515

Unclassified report

Trans. of Botanicheskii Zhurnal (USSR) v48 n1 p126 1963.

Descriptors: (*Plants(Biology), Fungi), (*Fungi, Plants(Biology)), Corn, Smuts(Ustilago), Diseases, Parasitic diseases, USSR.

AD-616 975 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
IMMUNOLOGICAL EFFECTIVENESS OF BURCELLOSIS VACCINATION,
by A. M. Kasyanenko. Dec 63, 10p Trans-983
TT 65-62516

Unclassified report

Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR) v40 n8 p39-44 1963.

Descriptors: (*Brucella, Vaccines), (*Immunity, Brucella), Diseases, Antigen-antibody reactions, Allergy, Diagnosis, Effectiveness, Tables, USSR.

A study was undertaken of the immunological efficacy of the live brucellosis vaccines by vaccinating workers of a meat plant with subcutaneous and skin dry live

vaccines of the Gamaleya Institute of Epidemiology and Microbiology of the USSR Academy of Medical Sciences. Serological and allergic shifts were determined 1-3, 3-6, 6-9 months later as well as after 9 months. These vaccines (both subcutaneous and skin) proved to provoke only mild untoward reaction in response to their administration. In 3-6 months the highest percentage (95 per cent) of immune individuals was revealed in persons immunized subcutaneously, and in 1-3 months - among the skin vaccinated ones. Immunological reconstruction in persons vaccinated subcutaneously was more prolonged than in those vaccinated by the skin method (for over 9 months - in 49 and in 86.6 per cent of the cases respectively). It was confirmed that the body immunological reconstruction in subcutaneously vaccinated persons followed the general regularities of the infectious process development in brucellosis, whereas in skin immunization, allergic reconstruction occured at the early periods, and then disappeared. The data obtained indicated that Huddleson's reaction could serve as a relative index of immunological efficacy of brucellosis vaccines. High antibody titres according to Wright's reaction (1:400) in the blood serum of the vaccinated individuals pointed to the necessity of careful approach to brucellosis diagnosis in the vaccinated individuals. (Author)

AD-616 976 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
THE EFFECT OF IRON ON THE VIRULENCE AND IMMONOGENICITY OF AVIRULENT PASTEURELLA PESTIS STRAINS,
by L. A. Avanyan, N. E. Gubina, and V. F. Ivanova.
Jan 64, 13p Trans-1001
TT 65-62517

Unclassified report

Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR) v40 n5 p17-23 1963.

Descriptors: (*Pasteurella pestis, Vaccines), (*Vaccines, Pasteurella pestis), Iron compounds, Sulfides, Viability, Immunity, Culture media, Bacteria, Blood, Toxins + antitoxins, Mice, Guinea pigs, USSR.

In passage of avirulent Past. pestis strains (vaccine strains EV and No. 1) through the organism of albino mice with a simultaneous administration of iron protosulfide there was a considerable rise in the residual virulence of the mentioned strains. Cultures of EV and No. 1 strains passaged through the organism of albino mice with a simultaneous administration of the iron salt become more immunogenic for guinea pigs as compared to the initial cultures of these strains. (Author)

AD-617 005 Div. 16/4
CFSTI Prices: HC$1.00 MF$0.50

Maryland Univ., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE. VOL. IV, NO. 7,
ed. by George Anastos. 1965, 18p
Contract DA49 193md2238

Unclassified report

See also AD-616 003.

Descriptors: (*Insects, Bibliographies), (*Disease vectors, Bibliographies), Ticks, Mites, Diptera, Siphonaptera, Lice, Insecticides, Pest control, Ecology, Blattidae, Viruses, Bacteria, Rickettsia, Spirochaeta, Worms, Parasites, Parasitic diseases, Virus diseases, Immunity, Epidemiology, USSR, Eastern Europe, China.

AD-617 009 Div. 16/10, 29/2

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
NUTRITIONAL ACCEPTABILITY OF A DEHYDRATED DIET.
Final rept. for 18 Feb-30 Mar 64,
by E. W. Speckmann, K. J. Smith, J. E. Vanderveen, G. M. Homer, and D. Wiltsie Dunco. 1965, 7p
Rept. no. AMRL TR-65-33
Proj. 7164, Task 716405

Unclassified report

Pub. in Aerospace Medicine v36 n3 p256-60 Mar 1965. (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with Miami Valley Hospital, Dayton, Ohio. Research Dept.

Descriptors: (*Nutrition, Dehydrated foods), (*Food, Freeze drying), (*Diet, Astronauts), Space medicine, Life support, Body weight, Medical examination, Experimental data.

Precooked, dehydrated and bite size compressed foods were arranged into a nutritionally balanced four-day cycle experimental menu with four meals per day. A control menu composed of frozen, fresh and heat processed foods was prepared to match the experimental diet. The control and experimental diets were prepared and/or reconstituted with room temperature water and both diets were served at room temperature to four healthy college students for 20 days while they were confined to an experimental metabolic facility. A difference in the organoleptic quality of the experimental and control diets could not be ascertained in the duration of this study. No evidence of monotony was revealed in either diet during the 20-day feeding trial. Both diets were highly digestible when fed to human volunteers. Subjects fed the control or experimental diet were maintained in nitrogen and energy balance. The subjects did not notice an increased gas production on either the control or experimental diet nor did they encounter gastrointestinal distress at any time. (Author)

AD-617 011 Div. 16/1, 12/1

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MAN'S SHORT-TIME TOLERANCE TO SINUSOIDAL VIBRATION.
Final rept. for Jan 61-Jan 64,
by William E. Temple, Neville P. Clarke, James W. Brinkley, and Morris J. Mandel. 1965, 10p
Rept. no. AMRL TR-65-96
Proj. 7231, Task 723101

Unclassified report

Pub. in Aerospace Medicine v35 n10 p923-30 Oct 1964. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Acceleration tolerance, Astronauts), (*Tolerances(Physiology), Vibration), Safety harness, Manned spacecraft, Stress(Physiology), Exposure, Space medicine, Tables.

Man's voluntary, subjective, short-time tolerance limits to sinusoidal vibrations at frequencies between 3 and 20 cps in the three orthogonal axes have been determined. The general shape of a series of curves depicting tolerable levels of vibration acceleration as a function of frequency has been defined. Two different support and restraint systems have been employed and the influence of the system used on the tolerance limits reached has been discussed. Reasons for the observed differences have been analyzed. It has been found that the magnitude of acceleration tolerated at each frequency and, to some extent, the type of symptom are influenced by both the

experimental design and the support and restraint system used. Furthermore, the type of symptom occurring appears to be somewhat dependent upon the acceleration level reached. Emphasis is given to the fact that, for manned space vehicles, high amplitudes of vibration in the 1 to 20 cps frequency range are to be avoided if possible. If this is not possible, the results suggest that future design considerations include provision for close coupling of body and head (with helmet and linear) to the support system to improve tolerance to the frequencies below 10 cps. Between 10 and 20 cps, methods of isolating the body and particularly the head from vibration input of high amplitude need to be provided. These data serve as a rough guide in evaluating the severity of the effects of vibration in the three axes studied, but their direct application to the design of operational vehicles undergoing high linear acceleration accompanied by vibration is limited by the meager knowledge now available of the effects of their forces when present simultaneously. (Author)

AD-617 020 Div. 16/5

Aerospace Medical Div., Air Force Systems Command, Brooks AFB, Tex.
PERIODONTAL STATUS AS RELATED TO CORTISONE ORAL GLUCOSE TOLERANCE RESPONSE,
by Ira L. Shannon and William A. Gibson. 1965, 6p
Unclassified report

Pub. in Periodontics v3 n1 p23-8 Jan-Feb 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Toxic tolerances, Dentistry), (*Corticosteroid agents, Toxic tolerances), (*Dentistry, Corticosteroid agents), Glucose, Blood, Carbohydrates, Metabolism, Diabetes, Teeth, Mouth, Diseases, Urine, Statistical analysis.

Cortisone supplemented oral glucose tolerance tests were carried out on 156 apparently healthy young adult males. Results were compared with those from 300 comparable subjects who underwent conventional oral glucose tolerance testing. All subjects were classified as to periodontal index rating. The addition of cortisone to the oral glucose tolerance testing procedure increased the means for serum glucose at each sampling interval. In neither the conventional nor the cortisone supplemented groups was there a significant indication that glucose tolerance responses could be related to periodontal status. (Author)

AD-617 027 Div. 16/8, 8/2

Walter Reed Army Inst. of Research, Washington, D. C.
A VERSATILE CURRENT-REGULATED BIDIRECTIONAL STIMULATOR.
Rev. ed.,
by Vincent J. Caggiano. 21 Aug 64, 8p
Unclassified report

Pub. in IEE TRANSACTIONS ON BIO-MEDICAL ENGINEERING vBME-12 n1 p32-9 Jan 1965.
(Copies not available to DDC or Clearinghouse customers).
Revision of manuscript submitted 17 Jun 64.

Descriptors: (*Brain, Stimulation), (*Electrotherapy, Instrumentation), Electrodes, Biophysics, Tissues-(Biology), Electric currents, current regulators, Gates(Circuits), Nervous system, Physiology, Histology.

Based on requirements specified by several investigators engaged in studies involving electrical stimulation through electrodes chronically implanted in brain substance, an electrical stimulator was designed and built. The instrumentation problems encountered in stimulation studies are discussed to emphasize the need for certain features adapting the instrument to the biophysical characteristics of living brain tissues. The resulting stimulator output is bidirectional, current-regulated and isolated, and provides isolated monitors for current ranges from 0.1 mA to 10 mA and pulses from 0.1 ms to 10 ms wide. Detailed schematic diagrams, waveforms and current regulation curves are included. Histological observations indicate that little if any tissue damage around the stimulation points occurs even with daily serial stimulations extended over several months. (Author)

AD-617 031 Div. 16/3

Texas Univ., Dallas. Southwestern Medical School.
LIPOLYTIC ACTIVITY IN THE BLOOD AFTER LIPASE INGESTION,
by Herbert C. Tidwell, James C. McPherson, W. Taft Moore, J. Lon Pope, and Alan Freeman. 30 Mar 64, 5p
Unclassified report

Pub. in Proceedings of the Society for Experimental Biology and Medicine v116 p720-3 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Enzymes, Blood chemistry), (*Fats, Blood chemistry), Lipids, Lipoproteins, Pancreas, Bile, Fatty acids, Absorption(Biological), Blood.

The nature of the enzyme appearing in the blood after oral ingestion of pancreatic lipase has been studied by determining the effect of the presence of cholic acid upon the activity of some enzymes which might be present. The activity of lipoprotein and serum lipase were markedly depressed by the bile acid while the enzymic activity of both pancreatic lipase and the enzyme present in the blood after pancreatic lipase ingestion were greatly enhanced by the presence of cholic acid. Although the rate of fat absorption has been shown to be affected by lipase ingestion, the possibility remains that this increased lipolytic activity may play some role in clearing the blood of fat. (Author)

AD-617 047 Div. 16/3

Texas Univ., Dallas. Southwestern Medical School.
THE FATE OF CHYLOMICRONS IN RATS TREATED WITH TRITON WR-1339,
by W. Taft Moore, Herbert C. Tidwell, and James C. McPherson. 1965, 7p
Contracts DA49 007MD662, DA49 193MD2499
Unclassified report

Pub. in American Journal of Clinical Nutrition v16 n1 p135-40 Jan 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lipids, Blood), (*Fats, Absorption(Biological)), (*Cleaning compounds, Blood chemistry), Tracer studies, Fatty acids, Metabolism, Liver, Biosynthesis, Oxidation.

During alimentary lipemia, the newly formed chylomicrons do not appear to be significantly bound by circulating Triton as the increase in esterified fatty acid levels are similar in both fasting and fed rats given Triton. Studies with C14-labeled lipids suggest that there is a delay in the appearance of chylomicrons in the blood or that they are removed at a more rapid rate. The subsequent oxidation of the absorbed lipid, however, is decreased, the mechanism of which is unknown. Triton may act by affecting cellular oxidation so as to prevent normal utilization, or Triton may prevent the uptake of chylomicrons at the usual sites.

The oral administration of Triton appears to have no hyperlipemic action but does appear to reduce or delay the rate of fat absorption. Lipid particles of artifical emulsions appear to be bound by Triton and their removal from the circulation is delayed. (Author)

AD-617 048 Div. 16/4, 16/1, 16/14

Delaware Univ., Newark.
HEMATOLOGY IN THE NORMAL MALE GUINEA PIG.
Progress rept.,
by Frances J. Zeman and Charles G. Wilber.
11 Feb 65, 16p
Contract DA49 193MD2627 Unclassified report
Pub. in Life Sciences v4 p871-83 1965.
(Copies available only to DDC users).

Descriptors: (*Hematology, Guinea pigs), (*Guinea pigs, Hematology), Erythrocytes, Leukocytes, Lymphocytes, Hemoglobin, Blood cells, Blood counts, Laboratory animals, Males.

Normal hematological values for mongrel, male guinea pigs are given. A comparison with values found in the literature showed slightly higher erythrocyte and lower leukocyte levels, higher proportion of lymphocytes, and lower proportions of other cells in the differential count. (Author)

AD-617 056 Div. 16/4, 25/1
CFSTI Prices: HC$1.00 MF$0.50

Servomechanisms, Inc., Santa Barbara, Calif.
SOUND GENERATION IN HONEY BEES.
Final rept. for 1 May 63-30 Apr 64,
by Adrian M. Wenner. 15 Mar 65, 7p
Contract Nonr422600, Proj. NR301 735
Unclassified report

Descriptors: (*Hymenoptera, Sound), (*Sound, Hymenoptera), Theory, Vibration, Spectroscopy, Sound pitch, Sound transmission, Experimental data.

A modified hypothesis is presented on the manner of production. It is unlikely that any of the previous theories of sound production are correct. That is, neither wing movement through the air, sclerite vibration at wing bases, nor spiracular sound production are particularly apropos. Rather, it seems likely that honey bees trigger their wings at the base while the wing is going through its figure-8 sweep. This triggering, possibly by movements of sclerites past one another (or against the base of the wing), can occur not only once per wing sweep but once, twice, or more times. The sound we hear, in turn, is a result of the wings acting as diaphragms. This would explain the importance of microphone position when the wings are illuminated by strobe light triggered by the frequency of sound. It would also explain why a particularly loud bee succeeded in triggering the strobe light only on the down stroke of its wings---the sound produced by a striking of its hind legs by the wings would be more intense than that normally produced by a flying bee and would then be the frequency responsible for triggering the light flash. There is no reason to believe other bee sounds are produced by methods other than that proposed. A study of sound spectrograms of queen piping reveals that frequencies do not drop to zero between pipes under certain conditions. In such cases the frequencies drop part way to zero and rise again for the next pipe, indicating that a continuance of the sound between pipes is possible. (Author)

AD-617 057 Div. 16/8, 26/2
CFSTI Prices: HC$4.00 MF$0.75

George Washington Univ., Washington, D. C.
A STUDY OF THE FUNCTIONAL ROLE OF CENTRAL SERVICE WITHIN THE MODERN HOSPITAL.
Major rept.,
by Frederick J. Graves. Jun 65, 105p
Unclassified report

Submitted in partial requirement for the course Hospital Administration 295.

Descriptors: (*Hospitals, Management engineering), (*Medical equipment, Management engineering), (*Medical supplies, Management engineering), (*Management engineering, Hospitals), Nurses, Labor, Costs, Inventory, Medical personnel.

Study of the literature and a survey of several hospitals make the clear point that the role of Central Service is a dynamic one. From a historical view the functions of Central Service have moved from a concept in which a number of hospital activities prepared their own sterile supplies to a concept in which centralization and standardization have lead to a single service. Mechanization and the use of disposables have had a marked influence on the size and scope of the Central Service. Finally, some functions not traditionally a role of this service have been added depending upon what 'administration' feels the Central Service should do, and can do. A variety of factors such as facilities design, worker and supervisory skills, and user demands underlie these administrative decisions. The traditional role of sterile supply processing and handling of certain items of widely used patient-care equipment continues to occupy the major portion of the time expended in Central Service.

AD-617 070 Div. 16/1, 16/10
CFSTI Prices: HC$10.00 MF$3.00

Foreign Technology Div., Wright-Patterson AFB, Ohio.
CONGRESS OF THE ALL-UNION PAVLOV PHYSIOLOGICAL SOCIETY (10th) AT EREVAN, 1964. VOLUME II, NO. 2. SUBJECTS OF SCIENTIFIC PAPERS.
5 May 65, 704p FTD-TT-65-48
TT 65-62518 Unclassified report

Unedited rough draft trans. of mono. Sezd Vsesyouznogo Fiziologicheskogo Obshchestva (no. 10) Erevan, 1964. Tezisy Nauchnykh Soobshchenii v2 n2 p1-440 1964.

Descriptors: (*Medical research, USSR), (*Physiology, Symposia), Biochemistry, Morphology(Biology), Muscles, Brain, Heart, Endocrine glands, Respiratory system, Reproductive system, Digestive system, Gastrointestinal system, Central nervous system, Autonomic nervous system, Cardiovascular system, Musculoskeletal system, Proprioception, Vestibular apparatus, Acceleration tolerance, Adaptation(Physiology), Vision, Drugs, Pharmacology, Hypoxia, Behavior, Sleep, Metabolism, Neurology, Hemorrhage, Surgery, Hematology, Stress(Physiology), Radiation effects, Conditioned reflex, Psychophysiology, Insecticides, Toxicity, Animals, Abstracting.

AD-617 073 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
THE USE OF METHYLENE BLUE REDUCTION FOR IN VITRO DETERMINATION OF PASTEURELLA PESTIS VIRULENCE,
by E. I. Korobkova and I. V. Liskina. Feb 64,
12p Trans-1012
TT 65-62519
Unclassified report

Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR) n1 p73-9 1963.

Descriptors: (*Pasteurella pestis, Viability), (*Methylene blue, Culture media), Immunology, Oxidoreductases, Microbiology, Enzymes, Bacteriophages, Tables, USSR.

An attempt was made to use the methylene blue reduction by Past. pestis to differentiate in vitro the virulent strains from avirulent ones. A study was made of 25 Past. pestis strains; out of this number 10 were virulent and 15 avirulent. Avirulent strains were obtained by numerous transfers on streak slant agar at 37C. Comparison of reducing properties of avirulent and virulent strains demonstrated that the latter decolourized methylene blue much more slowly, and that this sign could be use for rapid determination in vitro of the virulent state of the strain. Avirulent Past. pestis variants, forming smooth colonies, decolourized the strain very slowly or not at all; this was connected with their biological peculiarities, i.e. weaker enzyme systems and bacteriophage infection. (Author)

AD-617 074 Div. 16/11, 32/1, 16/4
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
ON THE TOXICITY OF 'SIMAZIN', A HERBICIDE PREPARATION,
by A. V. Kovalenko and V. V. Svyatoslavova.
Feb 64, 6p, Trans-1016
TT 65-62520

Unclassified report

Trans. of Gigiena Truda i Professionalnye Zabolevaniya (USSR) v7 n5 p54-6 1963.

Descriptors: (*Herbicides, Toxicity), Triazines, Laboratory animals, Digestive system, Respiratory system, Skin, Poisoning, Dosage, Pathology, Rats, USSR.

Conclusions:
Simazin is a mildly toxic substance; the danger of acute poisoning by it is not great. Simazin is capable of exerting a toxic effect when taken through the organs of the respiratory and digestive tracts. Its effect on the skin does not present a serious hazard. Simazin possesses a comparatively weak capability for accumulation. From a hygienic point of view this herbicide may be used in agriculture. (Author)

AD-617 076 Div. 16/14, 16/6
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
SECOND SCIENTIFIC CONFERENCE CONVENED IN KIEV ON ISSUES OF HYGIENE, TOXICOLOGY OF FESTICIDES AND CLINICAL STUDY OF POISONINGS,
by E. I. Spynu. Feb 64, 5p
Trans-1020
TT 65-62522

Unclassified report

Trans. of Gigiena Truda i Professionalnye Zabolevaniya (USSR) v7 n5 p58-9 1963.

Descriptors: (*Agriculture, Public health), (*Pesticides, Toxicity), Poisoning, Herbicides, Industrial medicine, Nutrition, Symposia, USSR.

AD-617 077 Div. 16/4, 32/1
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
PHENOLOGICAL OBSERVATIONS IN STEPPE COMMUNITIES WITH A CONSIDERATION OF THE MORPHOLOGY AND BIOLOGY OF PLANTS,
by Z. G. Bespalova and I. V. Borisova. Aug 64, 20p Trans-1150
TT 65-62523

Unclassified report

Trans. of Botanicheskii Zhurnal (USSR) v48 n9 p1271-81 1963.

Descriptors: (*Plants(Botany), Morphology(Biology)), (*USSR, Plants(Botany)), Biology, Ecology, Pollen, Growth, Trees, Grasses, Fruits, Deserts, Rhythm(Biology).

AD-617 090 Div. 16/4
CFSTI Prices: HC$1.00 MF$0.50

Office of Aviation Medicine, Federal Aviation Agency, Washington, D. C.
AVIATION MEDICINE TRANSLATIONS: ANNOTATED BIBLIOGRAPHY OF RECENTLY TRANSLATED MATERIAL, III.,
by Mary Ellen Allen, William E. Collins, Jerry V. Tobias, Ruth Ann Crain. Apr 65, 19p
Rept. no. AM-65-17
TT 65-62526

Unclassified report

Descriptors: (*Bibliographies, Aviation medicine), (*Aviation medicine, Bibliographies), Medical research, Vision, Vestibular apparatus, Physiology, Rhythm(Biology), Adaptation(Physiology), Stress(Physiology), Fatigue(Physiology), Hypoxia, Decompression sickness, Pilots, Night flight, Neuroses, Diabetes.

An annotated bibliography of translations of foreign-language research articles is presented. The 26 listed entries are concerned with studies of aviation medicine, periodicity, optokinetic nystagmus, vision, vestibular function, and physical science. Procedures for obtaining copies of the translations are included. (Author)

AD-617 091 Div. 16/4
CFSTI Prices: HC$1.00 MF$0.50

Civil Aeromedical Research Inst., Oklahoma City, Okla.
ADAPTATION TO VESTIBULAR DISORIENTATION: I. VERTIGO AND NYSTAGMUS FOLLOWING REPEATED CLINICAL STIMULATION,
by William E. Collins. May 65, 16p
AM 65-18

Unclassified report

Descriptors: (*Vestibular apparatus, Stimulation), (*Vision, Adaptation(Physiology), Vertigo, Eye, Motion, Ear, Attention, Sound signals, Reaction(Psychology), Reflexes, Tables, Analysis of variance.

Forty unilateral caloric irrigations were administered in a habituation series to each of two groups of subjects. One group was tested in total darkness. Subjects in the second group were stimulated in illumination and actively attempted to control and suppress their eye movements by means of visual fixation. Pre- and post-tests were administered (always in total darkness) in which both directions of response were elicited. In all cases, tasks were assigned to subjects to maintain alertness. The nystagmic reaction was altered as a result of the habituation series, but the change was different for the two groups. After one month of rest, there was no apparent recovery of the response toward the pretest level for either group. Sensations of vertigo declined in intensity for both groups, but showed recovery after a one-month rest period. (Author)

AD-617 115 Div. 16/1, 30/2
CFSTI Prices: HC$1.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
ELECTRONIC ANALOG SIMULATION OF THE MAMMALIAN CARDIOVASCULAR SYSTEM, PART 3,
by Edward A. Wright and William C. Burton.
10 May 65, 20p Rept. no. TM-65-24
Projs. DA1P010501A001, 31100
Unclassified report

See also AD-615 271.

Descriptors: (*Analog computers, Bionics), (*Cardiovascular system, Models(Simulations)), (*Bionics, Cardiovascular system), Heart, Performance(Human), Mammals, Simulation, Nervous system, Physiology, Mechanical organs, Anatomical models.

This report describes the third model of a series of three elementary, electronic analog computer models simulating the mammalian cardiovascular system. Work on this third model was terminated prior to its completion because of a lack of funds; hence, this report describes the modeling of a complex cardiac function, the only part of the task completed to date. This two-chambered 'heart' demonstrates the nervous activity exhibited by the real heart including the roles played by the SA node, the AV node, atrial tissue, and ventricular tissue in establishing heart rate. The effect of cardiac nerve block can be simulated. Provision is also made for simulating strength of contraction. The ultimate goal of this effort is the complex simulation of the entire mammalian cardiovascular system. Work will be resumed if funds become available. (Author)

AD-617 134 Div. 16/10, 20/2
CFSTI Prices: HC$2.00 MF$0.50

Naval Radiological Defense Lab., San Francisco, Calif.
NATURE AND EXTENT OF INTERNAL RADIOACTIVE CONTAMINATION OF HUMAN BEINGS, PLANTS, AND ANIMALS EXPOSED TO FALLOUT.
Addendum rept.,
by S. H. Cohn, R. W. Rinehart, J. K. Gong, J. S. Robertson, and W. L. Milne. 1954, 48p
Proj. 4 1
WT 936 Unclassified report

Rept. on Operation CASTLE, Pacific Proving Grounds. Research done in cooperation with Naval Medical Research Inst., Bethesda, Md.
Declassified 22 Jun 65.

Descriptors: (*Nuclear explosions, Radiation hazards), (*Radiation hazards, Fission product poisoning), (*Radiation effects, Humans), (*Radiological contamination, Plants(Botany)), (*Radioactive fallout, Animals), Urine, Excretion, Permissible dosage, Toxicity, Beta decay, Decontamination, Tissues(Biology), Autoradiography, Pathology, Chickens, Fishes, Food, Water, Soils.

The first instance of exposure of human beings to mixed fission products occurred as a result of the contaminating detonation of 1 March 1954. Beta activity in the urine of these exposed human beings indicated significant internal contamination from the ingestion and inhalation of fallout material. The body burden of the group of human beings with the greatest internal contamination was of the order of the maximum permissible concentrations for the individual radionuclides. Few of the fission products present in the environment were readily absorbed by the bloodstream from the lungs and the gastrointestinal tract. Most of those radioelements that gained entry into the body had short radiological and biological lives, and thus the levels of activity in the tissues of the body were relatively low. The concentration of radioisotopes at 6 months postdetonation was barely detectable in the urine of most of the exposed individuals. The human body burden of individual radionuclides was estimated from radiochemical analysis of the human urine and of the tissues and urine of animals from Rongelap. The mean body burdens of the radionuclides in the Ailinginae group were approximately one-half those of the Rongelap group, and the mean body burdens of the American group were about one-fourth those of the Rongelap group.

AD-617 146 Div. 16/1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
ON THE TEMPERATURE LIMIT OF ARTIFICIALLY COOLING THE ORGANISM OF MAMMALS,
by K. P. Ivanov and I. P. Pavlov. 18 May 65, 7p
FTD-TT-65-74
TT 65-62537
Unclassified report

Unedited rough draft trans. of Priroda (USSR) v48 n8 p93-4 1959. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Mammals, Hypothermia), (*Hypothermia, Mammals), Viability, Body temperature, Blood circulation, Respiration, Thresholds(Physiology), Stress(Physiology), Low-temperature research, Cooling, Dogs, Laboratory animals, Rats, Heart, Artificial respiration, USSR.

An article on restoration of mammals to normal vital activity after extremely low cooling is presented. Lower limits of cooling extend to 1-OC.

AD-617 160 Div. 16/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
EXCRESENCES ON THE SURFACE OF SPORES OF ANAEROBIC BACTERIA OF THE CLOSTRIDIUM GENUS,
by N. A. Krasilnikov, V. I. Duda, and A. A. Sokolov.
19 May 65, 17p FTD-TT-65-59
TT 65-62544
Unclassified report

Unedited rough draft trans. of Mikrobiologiya (USSR) v33 n3 p454-8 1964.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Clostridium, Spores), (*Spores, Morphology(Biology)), Surfaces, Growth, Culture media, USSR.

Spores of 20 different strains belonging to different obligate anaerobic bacteria of the Clostridium genus were studied. The majority of them show protrusions on the spore surface in the form of tails, bundles of flagella and threads either covering the whole spore surface or being attached to one end of the spore. The outer morophology and the fine structure of the protrusions - the constant appendages of spores differ in different bacterial species and represent the stable species characters. According to the form of spores and protrusions as well as to their size the cultures can be divided into 6 groups. Some anaerobic bacteria are described as new species: C1. sporopenitum, C1. sporocristum, C1. sporofilum, C1. sporospilum, C1. sporospinum, C1. sporoverrucosum, C1. sporopilosum, C1. sporostellatum, C1. sporoappendiculatum, C1. sporotrichum, C1. sporosetosum, C1. sporocomosum, C1. spororenalis nov. sp. (Author)

AD-617 161 Div. 16/2
CFSTI Prices: HC$2.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.

MICROBIOLOGY, 1964, VOL. 33, NO. 3 (SELECTED ARTICLES),
by G. N. Perminova and G. G. Vinberg. 18 May 65, 26p FTD-TT-65-66
TT 65-62545

Unclassified report

Unedited rough draft trans. of Mikrobiologiya (USSR) v33 n3 p472-6, 508-15 1964.

Descriptors: (*Microbiology, Algae), (*Algae, Soils), (*Plankton, Sewage), Microorganisms, Growth, Nitrogen, Culture media, USSR.

Contents: Effect of blue-green algae on the development of microorganisms in the soil; Cultivation of green plankton algae on sewage.

AD-617 163 Div. 16/11
CFSTI Prices: HC$1.00 MF$0.50

Army Biological Labs., Frederick, Md.
TOXICOLOGICAL EVALUATION OF AMMONIUM SULFAMATE-A HERBICIDE PREPARATION,
by M. K. Vinokurova and V. B. Malkova. Feb 64, 4p Trans-1014
TT 65-62546

Unclassified report

Trans. of Gigiena Truda i Professionalnye Zabolevaniya (USSR) v7 n5 p56-7 1963.

Descriptors: (*Herbicides, Sulfamic acids), (*Sulfamic acids, Herbicides), (*Ammonium compounds, Sulfamic acids), (*Toxicity, Herbicides), Tests, Laboratory animals, Lethal dosage, Aerosols, Skin, USSR.

Ammonium sulfamate is a comparatively weakly toxic substance. With oral administration the LD(50) for mice equals 3.1g to 1 kg of body weight, for rats - 4.4g/kg. There were no accumulative properties of ammonium sulfamate detected. The effects of numerous exposures to an aerosol of ammonium sulfamate in concentrations of 0.25 - 0.5 g/1 caused the occurrence of desquamated catarrh of the upper respiratory tract. The application of a 20% solution of ammonium sulfamate on the skin may cause an infraction of the entirety of the surface layer of skin; there is no overall toxic influence detected during this. From a hygienic point of view ammonium sulfamate may be widely used in agriculture with the application of the usual measures of protecting the respiratory organs and exposed parts of the skin. (Author)

AD-617 166 Div. 16/1
CFSTI Prices: HC$2.00 MF$0.50

Naval School of Aviation Medicine, Pensacola, Fla.
HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN: TRANSFER AND RETENTION OF EFFECTS FROM TWELVE DAYS OF ROTATION AT 10 RPM.
Research rept.,
by Fred E. Guedry, Jr. 26 Mar 65, 32p
Rept. no. NSAM-921
Proj. MR005 13 6001, Task 1
NAVMED MR005.13-6001.1-109

Unclassified report

Joint rept. with National Aeronautics and Space Administration, Washington, D. C.

Descriptors: (*Vestibular apparatus, Stimulation), (*Rotation, Tolerances(Physiology)), Acceleration tolerance, Vision, Proprioception, Head, Motion, Posture, Stress(Physiology), Performance(Human).

In three experimental runs, a total of nine men rotated at 10 RPM for twelve days. Eight control subjects were tested at comparable intervals. Rotating chair tests conducted before and after the twelve-day run demonstrated that nystagmus and subjective effects produced by head movements during the accustomed direction of rotation (CCW) had diminished markedly. In the unaccustomed rotation direction (CW) one hour after room rotation, nystagmus and subjective reactions approximately equaled reactions which would facilitate reactions during the CW rotation and counteract reactions during CCW rotation. Two days after the twelve-day run, responses to both rotation directions were suppressed as compared with initial levels of response; compensatory reactions had apparently dissipated. Some response decline was still present three weeks after the twelve-day run, but tests after three months revealed considerable recovery toward initial response levels. Reactions to passive whole-body angular acceleration were not greatly altered by the twelve-day run. (Author)

AD-617 200 Div. 16/3

Defence Research Medical Labs., Toronto (Ontario).
THE LIPOTROPIC ACTION OF COLD. 2. THE INFLUENCE OF COLDS AND CHOLINE DEFICIENCY ON SERUM LIPIDS OF RATS AT DIFFERENT INTAKES OF DIETARY METHIONINE.
Research paper,
by M. W. Radomski and J. D. Wood. 11 Dec 64, 6p Rept. no. RP-584

Unclassified report

Pub. in Canadian Journal of Physiology and Pharmacology v43 p451-6 1965 (Copies available only to DDC users).

Descriptors: (*Methionine, Diet), (*Lipids, Deficiency diseases), (*Cholines, Deficiency diseases), (*Deficiency diseases, Cold weather tests), Exposure, Cholesterol, Phospholipids, Liver, Synthesis, Canada.

The effect of exposure of rats to cold for a 10 day period on the concentration of serum lipids in control and choline-deficient animals was studied at four dietary intakes of methionine. Changes in total lipids, total and free cholesterol, phospholipid, and triglyceride levels were measured. In control (choline-fed) animals, phospholipid, cholesterol, and the ratio of free:ester cholesterol levels were not altered by cold exposure, but a marked decrease (25-30%, $P < 0.01$) in the levels of total serum lipids occurred. This was a result of a 45-70% decrease in triglyceride levels. The concentration of the triglyceride-rich low-density lipoproteins (S_f 10-400) in the serum fell in the cold-exposed animals as indicated by lowered triglyceride:cholesterol ratios. Although cold exposure prevented fatty livers in choline-deficient rats at high methionine intakes, it did not prevent the characteristic decrease in serum lipids found in choline deficiency at any of the methionine intakes studied. Decreases in total lipids (20-40%), triglyceride (10-50%), cholesterol (15-40%), and phospholipids (15-40%) were found. It was concluded that the ability of cold exposure to overcome choline deficiency is limited, apparently, to the fatty liver syndrome and has no effect on the decreased serum lipid levels. (Author)

AD-617 205 Div. 16/4

Queen Mary Coll., Univ. of London (England).
SYNTHESIS OF CITRULLINE AND ARGININE IN CHLORELLA PYRENOIDOSA,
by R. G. Hiller. 30 Mar 63, 7p
Contract AF61 052 245
AFOSR 65-0953

Unclassified report

Pub. in Journal of Experimental Botany v15 n43 p15-20 Feb 1964.

(Copies available only to DDC users).

Descriptors: (*Algae, Radioactivity), (*Amino acids, Biosynthesis), Carboxylic acids, Carbon dioxide, Urea, Enzymes, Great Britain.

The distribution of radioactivity in Chlorella during dark 14CO2 fixation was investigated either (a) in normal cells with and without added ammonium chloride, or (b) in nitrogen-starved cells supplied with intermediates of the Krebs-Henseleit urea cycle. In the control experiments almost all the activity was present in compounds of or associated with, the tricarboxylic acid cycle. The amino-acids citrulline and arginine became radioactive only in the presence of ammonia or ornithine where initially they comprised 40-60 per cent. of the total activity, reactions of the Krebs-Henseleit urea cycle being implicated in their formation. No evidence could be found for a complete urea cycle. Unidentified compounds deriving their radioactivity from the C6 carbon of citrulline and/or arginine were detected and formed up to 40 per cent. of the total 14CO2 incorporated after 25 min. (Author)

AD-617 215 Div. 16/1

California Inst. of Tech., Pasadena.
REFLEX ACTIVITY IN SPINAL CATS WITH POSTASPHYXIAL RIGIDITY,
by A. Van Harreveld and D. Spinelli. 1964, 22p
Contract Nonr22034
Unclassified report

Pub. in Archives Internationales de Physiologie et de Biochimie v73 n2 p209-30 Nov 4 1964.
(Copies available only to DDC users).

Descriptors: (*Reflexes, Cats), (*Spinal cord, Reflexes), Nerves, Nerve impulses, Nervous system, Physiology, Muscles, Anesthesia, Anoxia, Inhibition, Stimulation.

The reflex activity in three groups of cats in which the spinal cord had been asphyxiated for 30 to 55 min, and which had been kept from one day to 2 weeks afterwards was compared with that in acute and chronic spinal control animals. Asphyxiation tended to produce in addition to a slight and transient initial tone a more pronounced secondary tone which developed usually a few hours after asphyxiation and tended to decrease or disappear from a few hours to 3 days later. A permanent late tone often developed in the legs about one week after asphyxiations of 30 to 35 min. In preparations with secondary tone the post-activation depression was less pronounced than in the controls and there was during certain phases of the recovery cycle evidence of indirect, interneuronal facilitation. Inhibition of the responses caused by stimulation of the gastrocnemius nerve by stimulation of the sural nerve was absent and antidromic inhibition was less pronounced than in the controls. The spinal cords of these preparations did conduct impulse trains at 50 to 400/sec considerably better than in acute spinal control preparations. Preparations asphyxiated for 30 to 35 min and exhibiting late tone in the legs showed a moderate post-activation depression. They exhibited antidromic inhibition.

AD-617 222 Div. 16/4

Columbia Univ., New York. Coll. of Physicians and Surgeons.
DEOXYRIBONUCLEIC ACIDS OF SPERM, EGGS AND SOMATIC CELLS OF THE SEA URCHIN, ARBACIA PUNCTULATA,
by George Alexander Carden III, Samuel Rosenkranz, and Herbert S. Rosenkranz. 1964, 4p
Contract Nonr26689; Grant PHS AI05111,
Proj. NR103 574 Unclassified report

Pub. in Nature v205 n4978 p1338-9 Mar 27 1965.
(Copies available only to DDC users).

Descriptors: (*Echinodermata, Desoxyribonucleic acids), (*Desoxyribonucleic acids, Echinodermata), Reproductive system, Aquatic animals, Eggs, Reproduction(Physiology), Sex glands, Genetics, Adults, Buoyancy, Density.

07. Chemistry

AD-616 448 Div. 4/3

North Carolina Univ., Chapel Hill.
REACTIONS OF METAL ACETYLACETONATES,
by J. P. Collman. 14 Sep 64, 8p
Grants NIH RG8350, DA ORD D31124G185
AROD 3179:6
Unclassified report

Pub. in Angewandte Chemie International Edition v4 n2 p132-8 1965 (Copies available only to DDC users).

Descriptors: (*O-heterocyclic compounds, Complex compounds), (*Complex compounds, Chemical reactions), (*Rhenium compounds, Complex compounds), (*Cobalt compounds, Complex compounds), (*Chromium compounds, Complex compounds), Fluoborates, Substitution reactions, Chromatographic analysis, Spectra(Infrared), Spectra(Visible + ultraviolet), Nuclear magnetic resonance, Chemical bonds, Molecular structure.

Certain metal acetylacetonates undergo reactions characteristic of aromatic systems. Outstanding among these are electrophilic substitutions and the formation of a stable diazonium fluoroborate. Unsymmetrically substituted chelates were prepared by stepwise substitution of trifunctional complexes. Chemical and physical properties of such mixed-ring complexes provide evidence for intramolecular interannular electronic effects transmitted through the metal ion. (Author)

AD-616 449 Div. 4/3

Cincinnati Univ., Ohio.
SYNTHESIS AND REACTIONS OF SOME TRIPHENYLPHOSPHAZINES. THE USE OF LONG-RANGE P(31)-H(1) COUPLING FOR STRUCTURE DETERMINATION,
by Gurdial Singh and Hans Zimmer. 17 Jul 64, 4p
Grants DA AROD31 124G122, NIH CY5841
AROD 2276:7
Unclassified report

Pub. in Journal of Organic Chemistry v30 p417-20 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Organic phosphorus compounds, Synthesis(Chemistry)), (*Azines, Synthesis(Chemistry)), Chemical reactions, Chemical bonds, Molecular structure, Phosphines, Bromides, Hydrazones, Ammonia, Iodides, Nuclear magnetic resonance, Spectra(Visible + ultraviolet).

Some beta-N-alkylidene- and -arylidenehydrazinotriphenylphosphonium bromides were synthetized by reacting triphenylphosphine dibromide with appropriate hydrazones. Dehydrobromination of these phosphonium bromides with sodamide in liquid ammonia led to the corresponding triphenylphosphazines. These triphenylphosphazines are nucleophiles as is shown by their reactions with methyl and ethyl iodides to yield alpha-N-alkyl-beta-N-alkylidene- and -arylidenehydrazinotriphenylphosphonium iodides. The structures of these phosphonium iodides were verified through n.m.r. spectroscopy. The ultraviolet and visible absorption data of triphenylphosphazines are compared with those of the corresponding hydrazones. (Author)

AD-616 450 Div. 4/3, 4/4

Cincinnati Univ., Ohio.
N-H STRETCHING FREQUENCY IN ALKYLAMINOTRIPHENYLPHOSPHONIUM SALTS,
by Gurdial Singh and Hans Zimmer. 1 Sep 64, 2p
Grant NIH CY5841
AROD 2276:8
Unclassified report

Pub. in Journal of Organic Chemistry v30 p313-4 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Organic nitrogen compounds, Chemical bonds), (*Organic phosphorus compounds, Chemical bonds), (*Spectra(Infrared), Organic phosphorus compounds), Amines, Aromatic compounds, Salts, Chlorides, Bromides, Iodides, Fluoborates, Ions, Phosphines.

Results, and their interpretation, are given of a systematic infrared study of the possible presence of N-H... type hydrogen bonds of chlorides, bromides, iodides, and fluoborates of methyl-, ethyl-, isopropyl-, and tertbutyl-amino triphenylphosphonium.

AD-616 451 Div. 4/3

Cincinnati Univ., Ohio.
REACTIONS OF TRIPHENYLPHOSPHINALKYLIMINES WITH BORON TRIFLUORIDE,
by Hans Zimmer and Gurdial Singh. 24 Mar 64, 3p
AROD 2276:9
Unclassified report

Pub. in Journal of Organic Chemistry v29 p3412-4 Nov 1964 (Copies not available to DDC or Clearinghouse customers).
Prepared for presentation in part at the International Symposium on Boron-Nitrogen Chemistry, U. S. Army Research Office (Durham), Duke Univ., Durham, N. C., Apr 63.

Descriptors: (*Organic phosphorus compounds, Chemical reactions), (*Boron compounds, Chemical reactions), (*Organic nitrogen compounds, Chemical reactions), (*Fluorborates, Synthesis(Chemistry)), Amines, Fluorides, Chemical analysis, Spectra(Infrared), Molecular structure, Phosphines.

Under a perfectly dry nitrogen atmosphere, boron trifluoride reacted with triphenyl phosphinalkyl imines (where alkyl = methyl, ethyl, isopropyl, or tert-butyl) to give triphenyl phosphinalkyl trifluoroboron complexes. In the presence of moisture the respective alkylamino triphenylphosphonium tetrafluoroborates were isolated. The products were characterized by C, H, and N analyses, and by infrared spectroscopy.

AD-616 458 Div. 4/4, 4/3

Cornell Univ., Ithaca, N. Y.
STEREOCHEMISTRY OF THE EIGHT-COORDINATE BISNITRILOTRIACETATOZIRCONATE (IV) ION,
by J. L. Hoard, E. Willstadter, and J. V. Silverton.
26 Jan 65, 3p Unclassified report
AROD 2254:12
Pub. in Journal of the American Chemical Society v87 n7 p1610-11 Apr 5 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Zirconates, Stereochemistry), (*Complex compounds, Zirconates), (*Stereochemistry, Zirconates), Molecular structure, Atomic orbitals, Chemical bonds, Crystal structure, X-ray diffraction analysis.

Evidence for quasi-cubic coordination of bis(nitrilotriacetato) zirconate ion is presented.

AD-616 459 Div. 4/4, 25/3

Noyes Chemical Lab., Univ. of Illinois, Urbana.
HYDROGEN, RHODIUM, AND IRIDIUM ELECTRODE POTENTIALS IN LITHIUM CHLORIDE-POTASSIUM CHLORIDE EUTECTIC,
by H. A. Laitinen and J. A. Plambeck. 12 Nov 64, 5p
AROD 1486:22
Unclassified report

Pub. in Journal of the American Chemical Society v87 p1202-6 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrogen, Electrodes), (*Rhodium, Electrodes), (*Iridium, Electrodes), (*Electrodes, Voltage), Lithium compounds, Potassium compounds, Chlorides, Eutectics, Hydrochloric acid, Platinum, Thermochemistry, Enthalpy, Entropy, Chlorine.

A hydrogen electrode suitable for use in anhydrous molten LiCl-KCl at 450C was prepared by bubbling mixtures of purified hydrogen and hydrogen chloride over a platinized platinum flag immersed in the melt. The potential of this electrode with respect to platinum foils in contact with platinum(II) was measured. Values of free energy, enthalpy, and entropy for the reaction H2(g) + Cl2(g) yields 2HCl(g) calculated from the potentials of the hydrogen and chlorine electrodes were in agreement with N.B.S. and JANAF values. Standard potentials were also determined for rhodium(III)-rhodium and iridium(III)iridium. (Author)

AD-616 460 Div. 4/4, 25/3

Noyes Chemical Lab., Univ. of Illinois, Urbana.
ELECTROCHEMISTRY AND REACTIONS IN MOLTEN Li2SO4-Na2SO4-K2SO4.
Revised ed.,
by K. E. Johnson and H. A. Laitinen. 29 Oct 62, 5p
AROD 1486:20
Unclassified report

Revision of manuscript submitted 9 Aug 62.
Pub. in Journal of the Electrochemical Society v110 n4 p314-8 Apr 1963
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sulfates, Electrochemistry), (*Lithium compounds, Sulfates), (*Potassium compounds, Sulfates), (*Sodium compounds, Sulfates), Reduction-(Chemistry), Sulfur, Oxides, Sulfides, Electric currents, Voltage, Decomposition, Chemical equilibrium, Palladium, Rhodium, Copper, Cobalt, Ionization potentials.

Sulfur and oxide are produced by electroreduction of the alkali sulfate solvent at 550C whereas active metals, e.g., Mg, yield sulfide and oxide ions. Current-voltage curves of dilute solutions of heavy metal sulfates show reduction waves corresponding to the formation of either (a) metal or (b) metal sulfide and oxide, the course of the reaction apparently being determined by the solubility of the sulfide. For the case (a), an electromotive force series on a molality scale was established for temperatures between 550C and 580C as follows: Pd(II), Rh(III), Cu(II), Ag(I), Cu(I), Co(II) (Pd(II) being the strongest oxidizing agent). The properties of solutions of higher transition metal oxides in the sulfate melt and the electrolysis of oxyanion melts in general are discussed. (Author)

AD-616 469 Div. 4/3

Massachusetts Inst. of Tech., Cambridge.
A NEW METHOD OF DIHALOCARBENE GENERATION BASED ON TRIHALOMETHYLMETAL COMPOUNDS,
by Dietmar Seyferth, Jeffrey Yick-Pui Mui, Michael E. Gordon, and James M. Burlitch. 24 Nov 64, 2p
Grant AF AFOSR502 64
AFOSR 65-0684
Unclassified report

Pub. in Journal of the American Chemical Society v87 p681-2 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Halogenated hydrocarbons, Synthesis-(Chemistry)), (*Metalorganic compounds, Pyrolysis), Fluorine compounds, Chlorine compounds, Tin compounds, Mercury compounds, Halides, Monocyclic compounds, Alkenes.

It was previously reported that trimethyl(trifluoromethyl)tin releases difluorocarbene at 150C. A procedure is now reported that allows utilization of this compound in CF2 generation at 80 in a nonbasic medium to give, in the presence of olefins, gem-difluorocyclopropanes in very good yield. This procedure also can be used to generate CCl2 from C6H5HgCCl2X (X = Cl and Br) at room temperature. Several examples are given to illustrate the utility of the method.

AD-616 470 Div. 4/4, 4/3

Utah State Univ. of Agriculture and Applied Science, Logan.
PYROLYSIS STUDIES. XIII. KINETICS OF THE VAPOR PHASE PYROLYSIS OF ARYLETHYL METHYL CARBONATES. A LINEAR FREE-ENERGY RELATIONSHIP FOR ORTHO SUBSTITUENTS,
by Grant Gill Smith and Brian L. Yates. 15 Sep 64, 5p
Grant AF AFOSR62 268, Proj. 9762, Task 9762 02
AFOSR 65-0678
Unclassified report

Pub. in Journal of Organic Chemistry v30 p434-8 1965
(Copies not available to DDC or Clearinghouse customers).
See also AD-613 921.

Descriptors: (*Pyrolysis, Reaction kinetics), (*Esters, Pyrolysis), (*Carbonates, Pyrolysis), (*Acetates, Pyrolysis), Stereochemistry, Thermochemistry, Dipole moments, Chlorine compounds, Fluorides compounds, Vapors.

The absolute reaction rate constants in the pyrolysis of a series of ortho-, meta-, and para-substituted 1-arylethyl methyl carbonates and some ortho-substituted 1-arylethyl acetates were determined. The mechanism of the pyrolysis of the carbonates is discussed. Even in the pyrolysis of the ortho-substituted esters, proximity effects are at a minimum for it is found that a linear free-energy relationship is obeyed between the pyrolysis of the ortho-substituted acetates and carbonates. Important differences are found between this relationship and the linear free-energy relationship obeyed by the metal- and para-substituted isomers. (Author)

AD-616 471 Div. 4/4

Texas Univ., Austin.
SPATIAL DISTRIBUTION OF INTENSITY IN A HELIUM AFTERGLOW,
by Franklin E. Niles and W. W. Robertson. 23 Apr 64, 2p
Grant AF AFOSR273 64
AFOSR 65-0563 Unclassified report

Pub. in The Journal of Chemical Physics v41 n5 p1523-4 Sep 1 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Helium, Glow discharges), (*Glow discharges, Intensity), Molecular properties.

AD-616 472 Div. 4/4, 25/3

Maine Univ., Orono.
INFLUENCE OF ELECTRIC AND MAGNETIC FIELDS ON THE MICROWAVE DIELECTRIC CONSTANT OF A LIQUID CRYSTAL WITH A POSITIVE DIELECTRIC ANISOTROPY,
by E. F. Carr. 8 Sep 64, 5p
Grant AF AFOSR605 64
AFOSR 65-0789
Unclassified report

Pub. in The Journal of Chemical Physics v42 n2 p738-42 Jan 15 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Organic nitrogen compounds, Dielectric properties), (*Crystals, Liquids), (*Microwaves, Crystals), Organic oxygen compounds, Anisotropy, Electric fields, Magnetic fields, Phase studies, Molecular association.

The dielectric constant and loss in the anisotropic and normal liquid phases of anisal-p-aminoazobenzene were measured at frequencies of 6 and 24 kMc/sec. Measurements were made with an external magnetic field parallel and perpendicular to the microwave electric field at both frequencies while the measurements in the presence of an external electric field were made at only 6 kMc/sec with the external electric field parallel to the microwave electric field. Results in the presence of an external magnetic field were similar to those for p-azoxyanisole and anisaldazine which have a negative dielectric anisotropy. Measurements in the presence of an external electric field indicate that the alignment of the molecules due to low frequency ac fields is comparable to that produced by magnetic fields providing saturation is reached. Disturbances which were due to an electric field appeared to have an appreciable effect on the alighment when dc fields were applied, but this was not observed for ac fields with frequencies between 20 and 300 000cps. (Author)

AD-616 492 Div. 4/4

South Carolina Univ., Columbus.
THE DISPERSION OF THE CONDUCTANCE OF A SALT IN LOW DIELECTRIC SOLVENTS,
by T. R. Nanney and W. R. Gilkerson. 2 Nov 64, 5p
AROD 2913:4
Unclassified report

Pub. in Journal of Physical Chemistry v69 p1338-42 1965(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ammonium picrate, Electrical conductance), Organic solvents, Dielectrics, Salts, Frequency, Halogenated hydrocarbons, Aromatic compounds, Recombination reactions.

The conductances of solutions of tetra-n-butylammonium picrate in 50 mole % o-dichlorobenzene-benzene solvent and in chlorobenzene have been measured at 25 as a function of frequency from 1 to 100 kc. The conductances increase with increasing frequency. The magnitude of the effect, at low salt concentrations, approaches that which one would predict from relaxation of the ion atmosphere (Debye-Falkenhagen effect), while at higher salt concentrations the magnitude of the effect approaches that which one would predict from relaxation of the ion-pair equilibrium. Ion-pair recombination rates calculated from the frequency dependence of the effect are in agreement with theory (Onsager) (J. Chem. Phys. 2:595 (1934)). (Author)

AD-616 599 Div. 4/4
CFSTI Prices: HC$1.00 MF$0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
CALCULATION OF CHEMICAL SHIFTS. III. TRIVALENT PHOSPHOROUS,
by H. S. Gutowsky and John Larmann. 5 Apr 65, 15p Technical rept. no. TR-82
Contract Nonr183413, Proj. NR051 215
Unclassified report

Prepared for publication in the Journal of the American Chemical Society.

Descriptors: (*Phosphorous compounds, Chemical bonds), (*Chemical bonds, Phosphorous compounds), Halides, Valence, Paramagnetic resonance, Quantum mechanics, Atomic orbitals, Mathematical analysis.

Expressions are developed for the isotropic, paramagnetic contribution sigma (2) sub A to the magnetic shielding of Group V nuclei in AX3 molecules, and for the anisotropy of the paramagnetic shielding tensor. The localized molecular orbital treatment employs hybridization and ionicity as bond parameters. A comparison of the (31)P shifts observed in PH3, P(CH3)3, and the phosphorus trihalides with values calculated for sigma (2) shows that differences in the latter account for the major features of the observed shifts. Also, the calculations indicate that the variations in sigma (2) do not depend solely upon changes in any one bond parameter. (Author)

AD-616 601 Div. 4/4, 4/3
CFSTI Prices: HC$1.00 MF$0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
SPIN ECHO NMR STUDIES OF CHEMICAL EXCHANGE. V. PERFLUOROCYCLOHEXANE,
by H. S. Gutowsky and Fu-Ming Chen. 6 Apr 65, 8p
Technical rept. no. TR-83
Contract Nonr183413, Proj. NR051 215
Unclassified report

Prepared for publication in the Journal of Physical Chemistry.

Descriptors: (*Halogenated hydrocarbons, Nuclear magnetic resonance), (*Cyclohexanes, Nuclear magnetic resonance), (*Exchange reactions, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Exchange reactions), Nuclear spins, Molecular isomerism, Fluorine compounds, Thermochemistry.

Perfluorocyclohexane was used as a further test (see AD-612 486) of the spin-echo methods to study intramolecular exchange of a coupled AB system.

AD-616 602 Div. 4/3
CFSTI Prices: HC$1.00 MF$0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
SPIN-ECHO NMR STUDIES OF CHEMICAL EXCHANGE. VI. REARRANGEMENT OF BULLVALENE AND OF ITS AgN03 COMPLEX,

by Adam Allerhand and H. S. Gutowsky. 29 Apr 65, 20p Technical rept. no. TR-84
Contract Nonr183413, Proj. NR051 215
Unclassified report

Prepared for publication in the Journal of the American Chemical Society.

Descriptors: (*Nuclear magnetic resonance, Chemical reactions), (*Chemical reactions, Nuclear magnetic resonance), Polycyclic compounds, Hydrocarbons, Silver compounds, Nitrates, Absorption spectrum, Metalorganic compounds, Reaction kinetics.

The degenerate Cope rearrangement of bullvalene has been studied from 25 to 123C, in a tetrachloroethylene solution, by means of a spin-echo nmr method, at 26.85 Mc/sec. In effect, the inhomogeneity broadening of the nmr absorption is avoided in the spin-echo experiments so that exchange rates could be measured which were faster by a ten-fold factor than the upper limit in previous high-resolution work. More precise values were obtained for the frequency factor, 0.8 x 10 to the 13th power/sec, and for the activation energy, 12.8 ± 0.1 kcal/mole. Bullvalene was found to form several complexes with AgN03 in D20 and in CH3CN solution, and with AgBF4 in CH2C1CH2C1. The rearrangement rates were reduced in these solutions. A 3:1 Ag+ to bullvalene system, 0.32 g in 7.15 M AgN03 in D20, was studied in some detail. For it, the apparent activation energy for the rearrangement is 15.1 ± 0.8 kcal/mole. (Author)

AD-616 630 Div. 4/4, 25/3, 14/8
CFSTI Prices: HC$1.00 MF$0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
ELECTRODE MOUNTING FOR POTENTIOSTATIC ANODIC POLARIZATION STUDIES,
by N. D. Greene, W. D. France, Jr., and B. E. Wilde. May 65, 8p Technical rept. no. TR-1
Contract Nonr59117
Unclassified report

Descriptors: (*Anodes(Electrolytic cells), Polarization), (*Plastic coatings, Electrostatics), Chromium alloys, Nickel alloys, Iron alloys, Epoxy plastics, Polyester plastics, Gaskets.

Samples of an arc melted, 10Cr- 10Ni- Fe alloy were mounted with the Stern-Makrides compression gasket assembly. Some electrodes were mounted directly, others were partially encased or coated with various resins prior to mounting. Potentiostatic anodic polarization measurements were performed in hydrogen-saturated, normal sulfuric acid at 25C, using an identical potential step technique for each specimen. Polarization behavior in the active region is unaffected by mounting material. However, all resins except heat-cured epoxy and alkyd types, markedly increase apparent passive current density. This is due to the presence of fine crevices at the electrode-resin interfaces. Although the area within crevices may be small, current density is high, and the effect on measured passive currents is pronounced. The results indicate that crevices in, or adjacent to, electrodes must be avoided during potentiostatic anodic polarization measurements. Specimens should be mounted with the Stern-Makrides compression gasket, in heat-cured epoxy resin, in alkyd varnish or other methods which ensure freedom from microscopic crevices. (Extracted)

AD-616 633 Div. 4/2
CFSTI Prices: HC$1.00 MF$0.50

Catholic Univ. of America, Washington, D. C.
Dept. of Chemistry.

REACTIONS OF CALCIUM, MAGNESIUM AND CERIUM HYDRIDES WITH AQUEOUS SOLUTIONS,
by Raymond A. Sutula and John B. Hunt. 15 May 65, 10p Technical rept. no. TR-1
Contract Nonr224911, Proj. NR052 458
Unclassified report

Descriptors: (*Hydrides, Heavy water), (*Reaction kinetics, Hydrides), (*Heavy water, Hydrides), Calcium compounds, Magnesium compounds, Cerium compounds, Chemical reactions, Test methods.

The report describes studies of reactions of CaH2, MgH2 and CeH2 with D2O solutions. The purpose of these studies was to establish the fate of hydride hydrogen in such reactions and the stoichiometry of reactions in which metal ions compete with D(+) as oxidizing agents.

AD-616 649 Div. 4/3
CFSTI Prices: HC$1.00 MF$0.50

Reactions Motors Div., Thiokol Chemical Corp., Denville, N. J.
CARBORANE-SILOXANE ELASTOMERS.
Quarterly progress rept. for 19 Feb-18 May 65, by Joseph Green. 18 May 65, 16p
Rept. no. RMD-5065-Q1
Contract DA11 070AMC852W, Proj. 5065
Unclassified report

Descriptors: (*Organoboranes, Elastomers), (*Siloxane, Elastomers), Synthesis(Chemistry), Polymerization, Polymers, Heat-resistant plastics.

The synthesis of thermally stable carborane-siloxane elastomers was undertaken. Carborane and silane intermediates prepared include: neocarborane, 1,7-diallylcarborane, 1,7-bis(3-(chlorodimethylsilyl) propyl) carborane, tetramethyldisiloxane, dichlorotetramethyldisiloxane and chlorodimethylsilane. A liquid polymer was obtained by silyl hydride addition polymerization of 1,7-diallylcarborane and tetramethyldisiloxane. A homopolymer of 1,7-bis(3-(chlorodimethylsilyl) propyl) carborane prepared by hydrolysis, was obtained as a gum; copolymers of this compound with diethoxydimethylsilane and dichlorotetramethyldisiloxane, obtained by alkoxy-halogen condensation and hydrolysis respectively, were liquids of 1800 and 2500 molecular weight. (Author)

AD-616 740 Div. 25/7, 25/6, 25/2
CFSTI Prices: HC$4.00 MF$1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EFFECTS OF UNIAXIAL STRESS UPON THE VISIBLE RUBY ABSORPTION SPECTRUM.
Master's thesis,
by Guy Calvin Spitale. Jun 65, 129p
Rept. no. SP/PH/65-10
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Ruby, Absorption spectrum), (*Stresses, Ruby), Spectra(Visible + ultraviolet), Cryogenics, Chromium, Ions, Crystal lattices, Distortion, Perturbation theory, Symmetry(Crystallography), Field theory, Interferometers, Programming(Computers).

An investigation of the effects of uniaxial stress upon the ruby absorption spectrum was conducted using a photographic technique. To reduce the effects of thermal broadening of spectral lines, ruby samples were immersed

in liquid nitrogen. A heretofore uninvestigated series of satellite absorption lines was found near the red doublet. Intensity is dependent upon the concentration of chromium in the lattice. This suggests that the newly observed lines are caused by exchange interactions between chromium ions. The effects on these lines of uniaxial stress was measured as a function of polarization and orientation of the c-axis. A linear dependence of spectral line position on stress, a general shift of all lines toward the red, and a marked splitting of the satellites were observed. A theoretical analysis from the point of view of crystalline field theory was conducted in the weak field scheme.

AD-616 759 Div. 4/4, 25/6
CFSTI Prices: HC$1.00 MF$0.50

California Univ., La Jolla.
SELF-CONSISTENT EQUATIONS INCLUDING EXCHANGE AND CORRELATION EFFECTS.
Technical rept.,
by W. Kohn and L. J. Sham. 17 Jun 65, 23p
Rept. no. TR-31
Contract Nonr2216 11, Proj. NR017 630
Unclassified report

Descriptors: (*Electrons, Potential theory), (*Potential theory, Electrons), Electron density, Mathematical models, Plasma physics, Energy, Temperature.

From a theory of Hohenberg and Kohn, approximation methods for treating an inhomogeneous system of interacting electrons are developed. These methods are exact for systems of slowly varying or high density. For the ground state, they lead to self-consistent equations analogous to the Hartree and Hartree-Fock equations, respectively. In these equations the exchange and correlation portions of the chemical potential of a uniform electron gas appear as additional effective potentials. (The exchange portion of our effective potential differs from that due to Slater by a factor of 2/3.) Electronic systems at finite temperatures and in magnetic fields are also treated by similar methods. An appendix deals with a further correction for systems with short wavelength density oscillations. (Author)

AD-616 761 Div. 4/3, 14/6, 14/8
CFSTI Prices: HC$1.00 MF$0.50

United States Rubber Co., Wayne, N. J. Research Center.
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES.
Quarterly rept. no. 2, 1 Feb-30 Apr 65,
by Douglas I. Relyea, Gerald J. Klender, and Aspet Merijanian. 14 May 65, 21p
Contract Nobs92060, Proj. SR007 03 03, Task 1000
Unclassified report

Descriptors: (*Heat-resistant plastics, Synthesis-(Chemistry)), (*Phosphononitriles, Polymerization), Quinones, Electric insulation, Thermosetting plastics, Thermoplastics, Organic solvents.

A soluble P-O-P linked polymer of MW(n) 7000 was obtained and found to be stable to 317C. The P-O-P linked polymer in which the theoretical repeating unit is -P3N3(OC6H5)4)- appears slightly more stable than the polymer with the theoretical repeating unit -P3N3(C6H5)2-(OC6H5)2O-. Polar solvents accelerate the reaction of P3N3C16 and hydroquinone at 80. A soluble polymer of MW(n)>6000 was prepared from P3N3(OC6H5)4C12 and disodiobisphenol A. Preliminary experiments directed toward preparing carborane-linked phosphonitrilic polymers are described. (Author)

AD-616 791 Div. 4/3

Suffield Experimental Station, Ralston (Alberta).
THE SYNTHESIS OF ALKYLPHOSPHONOUS DICHLORIDES FROM ALUMINUM CHLORIDE-PHOSPHORUS TRICHLORIDE-ALKYL CHLORIDE COMPLEXES.
Technical paper,
by B. J. Perry, J. B. Reesor, and J. L. Ferron.
8 Mar 63, 6p Rept. no. TP-189
Proj. D52 20 20 27
Unclassified report

Pub. in Canadian Journal of Chemistry v41 p2299-2302 1963 (Copies available only to DDC users).

Descriptors: (*Organic phosphorus compounds, Synthesis(Chemistry)), Chlorides, Aluminum compounds, Phosphorus compounds, Halogenated hydrocarbons, Reduction(Chemistry), Antimony, Phthalates, Canada.

In 1957, a new method for the synthesis of methylphosphonous dichloride, in high yield, by the reduction of the aluminum chloride-phosphorus trichloride-methyl chloride complex in diethyl phthalate solution by finely powdered antimony, was developed. That this is a general method for the synthesis of the more volatile alkylphosphonous dichlorides was demonstrated by the preparation, in good yield, of a series of compounds from the aluminum chloride-phosphorus trichloride complexes formed from ethyl chloride, n-propyl chloride, i-propyl chloride, n-butyl chloride, and s-butyl chloride. As expected, isomerization occurred in the case of the normal alkyl chlorides. (Author)

AD-616 795 Div. 4/4

California Univ., Santa Barbara. Dept. of Chemistry.
THE PARAHYDROGEN CONVERSION OVER SYNTHETIC RUBY,
by P. W. Selwood. 1 Feb 65, 2p
AROD 5658:1
Unclassified report

Pub. in Journal of the American Chemical Society v87 p1804-5 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ruby, Synthetic stones), (*Catalysis, Ruby), Hydrogen, Chromium, Ions, Catalysts, High-temperature research.

AD-616 800 Div. 4/3

Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
THE PHOSPHORYLATION OF 2-METHYL-DELTA(2)-OXAZOLINE,
by R. Greenhalgh. 5 Jan 62, 8p Rept. no. DRCL-363
Unclassified report

Pub. in Canadian Journal of Chemistry v40 p976-81 1962 (Copies available only to DDC users).

Descriptors: (*Organic phosphorus compounds, Synthesis(Chemistry)), (*O-heterocyclic compounds, Phosphorylation), (*N-heterocyclic compounds, Phosphorylation), Chlorine compounds, Amides, Molecular structure, Nuclear magnetic resonance, Canada.

In common with other acylating agents, diisopropyl phosphorochloridate reacts with 2-methyl-delta(2)-oxazoline in aqueous and ethereal media to yield N-phosphoryl derivatives. In both media, phosphorylation

is followed by ring opening between positions 1 and 5, as shown by the isolation of diisopropyl N-acetyl-N-2-chloroethylphosphoramidate and diisopropyl N-acetyl-N-2-hydroxyethylphosphoramidate. The latter compound undergoes further rearrangement, being slowly converted to diisopropyl N-2-acetoxyethylphosphoramidate in aqueous bicarbonate solution. Nuclear magnetic resonance studies of 2-methyl-delta(2)-oxazoline in aqueous bicarbonate solution (pH 8.5) reveal that it is all transformed to N-acetylethanolamine within 23 hours. This short lifetime allows speculation regarding the origin of 2-acetamidoethyl diisopropyl phosphate isolated from the reaction of the base with diisopropyl phosphorofluoridate. (Author)

AD-616 801 Div. 4/3

Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
OXIMES. I. THE SYNTHESIS OF SOME SUBSTITUTED 2-OXIMINOACETOPHENONES,
by J. J. Norman, R. M. Heggie, and J. B. Larose.
16 Mar 62, 8p Rept. no. DRCL-372
Unclassified report

Pub. in Canadian Journal of Chemistry v40 p1547-53 1962 (Copies available only to DDC users).

Descriptors: (*Oximes, Synthesis(Chemistry)), (*Ketones, Synthesis(Chemistry)), Organic oxygen compounds, Iodides, Amines, Friedel-Crafts reactions, Cholinesterase, Phenols, Canada.

The preparation of some p-(omega-dimethylaminoalkyl)- and p(omega-dimethylaminoalkoxy)-2-oximinoacetophenones and their methiodides is described. No general method was found for synthesis of short-chain (Co, C1, C2) p-(omega-dimethylaminoalkyl)-2-oximinoacetophenones. The longer-chain compounds (C3, C4) were prepared by a method which would appear to be general. Omega-Phenyl-1-haloalkanes undergo Friedel-Crafts acylation to yield p-(omega-haloalkyl)-acetophenones. These were converted to the dimethylamino compounds, which, subsequently, yielded 2-oximinoacetophenones. No method of preparation of p-(2'-dimethylaminoethyl)-2-oximinoacetophenone was found. Synthesis of p-(omega-dimethylaminoalkoxy)-2-oximinoacetophenones was accomplished using mixed alpha,omega-dihaloalkanes and p-hydroxyacetophenone. The p-(omega-haloalkoxy)-acetophenones from these reactants were first converted to oximes and then to the dimethylamino compounds. Syntheses of p-(omega-dimethylamino-ethoxy, -propoxy, -butoxy, and -pentoxy)-2-oximinoacetophenones were achieved. That of p-(dimethylaminomethoxy)-2-oximinoacetophenone was unsuccessful. (Author)

AD-616 811 Div. 4/4, 25/6, 14/2

Air Force Cambridge Research Labs., Bedford, Mass.
A PROPOSED METHOD FOR THE DETERMINATION OF THE STANDARD FREE ENERGY OF FORMATION OF A DOUBLE OXIDE BY A MASS SPECTROMETER.
Physical sciences research papers,
by Juris Smiltens. 18 Dec 63, 6p
Rept. nos. AFCRL65-234; PSRP-92
Proj. 5621, Task 562101
Unclassified report

Pub. in Journal Physical Chemistry Solids v25 p777-8 1964.
Revision of manuscripts submitted 1 Nov 63.
(Copies available only to DDC users).

Descriptors: (*Oxides, Thermochemistry), (*Thermochemistry, Oxides), (*Mass spectroscopy, Oxides), Ions, Energy, Spinels, Cobalt compounds, Ferrates, Magnesium compounds, Aluminates.

An equation for determination of the standard free energy of formation of a double oxide by means of a mass spectrometer has been derived. The quantities required by the equation are (1) the ratio of the intensities of an ion and (2) the ratio of the oxygen pressures at two equilibriums involving the double oxide and the constituent oxides. (Author)

AD-616 812 Div. 4/4

Air Force Cambridge Research Labs., Bedford, Mass.
TWO PHOSPHORESCENCES AND ELECTRON TRANSFER IN DYEDISULFHYDRYL COMPOUND COMPLEX.
Physical and mathematical sciences research papers,
by Eiji Fujimori. 1 Oct 64, 10p
Rept. nos. AFCRL 65-301; PMSRP-101
Proj. 8659, Task 865903
Unclassified report

Pub. in Journal of Physical Chemistry v69 n3 p940-3 Mar 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Thiols, Phosphorescence), (*Dyes, Phosphorescence), (*Complex compounds, Phosphoresence), (*Phosphorescence, Complex compounds), Ionization, Alcohols, Propanols, Absorption spectrum, Photosensitivity, Lactones, Chlorine compounds, Polycyclic compounds, Oxidation-reduction reactions.

Mercaptoethanol and dimercaptopropanol form a complex with a cationic dye. Two dyes interacting with two SH groups in the complex with dimercaptopropanol exhibit two different absorptions and two different phosphorescences. Each one of them, present at a shorter wave length, corresponds to an absorption and a phosphorescence of the complex with mercaptoethanol. The dye-dimercaptopropanol complex is more photosensitive than the dye-mercaptoethanol complex. A phototropism observed in the former complex is based on an electron transfer. (Author)

AD-616 830 Div. 4/3

Noyes Chemical Lab., Univ. of Illinois, Urbana.
LINEAR DEAMMONATION PRODUCTS OF SULFAMIDE AND THEIR DERIVATIVES,
by Piero Nannelli, Amedeo Failli, and Therald Moeller. 26 Oct 64, 5p
Contract DA31 124AROD35
AROD 3815:5
Unclassified report

Rept. presented at the National Meeting of the American Chemical Society (148th), Chicago, Ill., 3 Sep 64.
Pub. in Inorganic Chemistry v4 n4 p558-62 Apr 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Organic sulfur compounds, Decomposition), (*Amides, Decomposition), (*Organic phosphorus compounds, Synthesis(Chemistry)), Organic nitrogen compounds, Chlorides, Phosphorus compounds, Spectra-(Infrared), Condensation reactions.

Although both imidodisulfuric diamide (imidodisulfamide) and diimidotrisulfuric diamide are cleaved by phosphorus (V) chloride, the analogous 3-methylimidodisulfuric diamide and 3,5-dimethyldiimidotrisulfuric diamide react smoothly with this reagent to yield the highly reactive and synthetically useful bis(trichlorophosphazo) derivatives. The chlorine atoms in these compounds are readily replaced by phenyl and phenoxy groups via nucleophilic substitution,

with the formation of more hydrolytically stable products. An analysis of the infrared spectra of a number of these derivatives has permitted assignments of observed frequencies to the significant structural units. Data on other physical properties are given also. (Author)

AD-616 840 Div. 4/3, 4/4

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
POISONING EFFECTS AND STERIC FACILITATION IN CATALYTIC HYDROGENATION OF PERPHENYLATED GROUP IVb ATOMS,
by Leonard Spialter, Glen R. Buell, and Charles W. Harris. 12 May 64, 6p ARI 65-83
Unclassified report

Pub. in Journal of Organic Chemistry v30 p375-8 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Silanes, Hydrogenation), (*Germanium compounds, Hydrogenation), (*Tin compounds, Hydrogenation), (*Lead compounds, Hydrogenation), (*Hydrogenation, Catalysis), Metalorganic compounds, Stereochemistry, Catalysts, Inhibition, Impurities.

Studies of the nickel-catalyzed, heterogeneous hydrogenation of tetraphenyl derivatives of silicon, germanium, tin, and lead have led to the observation that the sterically crowded silicon compound absorbs hydrogen readily to give tetracyclohexylsilane while the others do not react under equivalent conditions. Even the less hindered silicon homolog, triphenylsilane, is not particularly reactive. It was observed that the presence of any of these other phenyl derivatives during hydrogenation of tetraphenylsilane affected the reaction seriously. Triphenylsilane and tetraphenylgermane markedly slowed hydrogen uptake, while the tin and lead analogs prevent any uptake. These results are interpreted as indicative of a poisoning effect on the catalyst by coordination with the central atom. Where initial steric hindrance prevents such coordination, normal hydrogenation of the phenyl groups occurs. (Author)

AD-616 939 Div. 4/4, 25/7

Army Electronics Labs., Fort Monmouth, N. J.
FLUORESCENCE OF Tb(3+) IN CaF2,
by Norman Rabbiner. 10 Aug 64, 3p
Unclassified report

Pub. in Journal of the Optical Society of America v55 n4 p436-8 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Fluorescence, Terbium), (*Terbium, Ions), Atomic energy levels, Symmetry(Crystallography), Line spectrum, Calcium compounds, Fluorides.

The three groups of fluorescent line spectra of Tb(3+) in CaF2 'spectrum I' between the crystal-field split levels of the 5D4 and the 7F3, 7F4, and 7F5 free-ion states have been combined into energy-level schemes which tend to support a cubic crystal field symmetry and which give information on the crystal-field split-level representations and energies to 5 1/cm for a thin crystal. (Author)

AD-616 958 Div. 4/4, 4/3

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
RARE GAS SENSITIZED RADIOLYSIS OF ACETYLENE,
by J. H. Futrell and L. W. Sieck. 5 Sep 64, 9p Rept. no. ARL 65-101 Unclassified report

Pub. in Journal of Physical Chemistry v69 p892-900 1965 (Copies not available to DDC or Clearinghouse customers).
Presented at the Annual Meeting of the Radiation Research Society (12th) Miami Beach, Fla., May 17-20, 1964.

Descriptors: (*Aliphatic compounds, Radiation chemistry), (*Radiation chemistry, Polymerization), (*Helium group gases, Aliphatic compounds), Polymers, Neon, Ionization.

The gas phase radiolysis of acetylene has been investigated in the presence and absence of various sensitizers at various dose rates. The polymerization reactions have been correlated with high-pressure, mass spectrometric studies of mixtures with rare gases, with the conclusion that the precursors for polymer propagation do not depend upon charge exchange (ionization of acetylene). A quantitative investigation of benzene production and sensitization indicates that neon is unique among the noble gases in that it alone enhances the formation. The initial interaction, Ne(+) + C2H2 to C2H(+) + H + Ne, observed mass spectrometrically is responsible. Various photolysis and radiolysis experiments involving argon-deuterium-acetylene and deuterium-acetylene mixtures have defined the mechanism for the increase in G(C6H6) observed in this work and in previous studies at lower dose rates. (Author)

AD-617 017 Div. 4/4

Cornell Univ., Ithaca, N. Y.
SPECTRAL WIDTH OF THE CRITICAL OPALESCENCE DUE TO CONCENTRATION FLUCTUATIONS,
by P. Debye. 12 Apr 65, 2p
Unclassified report

Pub. in Physical Review Letters v14 n19 p783-4 May 10 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Light, Scattering), (*Liquids, Optical properties), Reflection, Temperature, Line spectrum, Density.

AD-617 022 Div. 4/4

McGill Univ., Montreal (Quebec).
SHAPE OF A FLUID DROP AT A FLUID-LIQUID INTERFACE. I. EXTENSION AND TEST OF TWO-PHASE THEORY,
by H. M. Princen and S. G. Mason. 29 Oct 64, 18p
Grant DRB9530 47
Unclassified report

Pub. in Journal of Colloid Science v20 n2 p156-72 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Drops, Geometric forms), (*Films, Permeability), Phase studies, Bubbles, Air, Water, Colloids, Thickness, Surface tension, Canada.

The theory of the shape of a fluid drop at a fluid-liquid interface in two-phase systems was confirmed experimentally by measuring characteristic dimensions of stabilized air bubbles at an air-water interface. The equilibrium film at the top of the bubble may simultaneously consist of two types of film of different thickness. The condition for this situation and its effect on the permeability of the film to gases is discussed. Deviations from the shape theory will occur when the tension of the equilibrium film is smaller than twice the normal surface tension. Calculations were made to extend the theory to systems with such a reduced film tension. (Author)

AD-617 025 Div. 4/3

McMaster Univ., Hamilton (Ontario).
RADIATION-INDUCED GRAFT POLYMERIZATION OF STYRENE IN WOOD,
by K. V. Ramalingam, G. N. Werezak, and J. W. Hodgins. 1964, 15p
Unclassified report

Pub. in Journal of Polymer Science: Pt C n2 p153-67 1963. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Polymerization, Radiation chemistry), (*Wood, Plasticizers), (*Plasticizers, Copolymerization), (*Radiation chemistry, Polymerization), Styrene plastics, Cellulose, Gamma rays, Impregnation, Physical properties, Paramagnetic resonance, Spectroscopy, Free radicals, Feasibility studies.

Grafting of polystyrene to the cellulose in red pine sapwood has been accomplished by gamma irradiation of the ternary solution of styrene, methanol, and water. The resulting material possesses substantially enhanced bending strength and dimensional stability. Optimum conditions have been determined by a factorial experimental design. Electron spin resonance studies have revealed two distinct types of long-lived free radicals, one of which is the specific precursor for the grafting reaction. (Author)

AD-617 026 Div. 4/2

Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
A FLUOROMETRIC PROCEDURE FOR THE DETERMINATION OF CEROUS ION,
by William A. Armstrong, Douglas W. Grant, and William G. Humphreys. 15 Apr 63, 3p
Rept. no. DRCL-413
Unclassified report

Pub. in Analytical Chemistry v35 n9 p1300-1 Aug 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cerium, Chemical analysis), (*Fluorometers, Cerium), (*Ions, Cerium), Test methods, Spectrophotometers, Excitation, Fluorescene.

During an investigation of the aqueous ceri sulfate dosimeter, it became necessary to determine cerous ion concentrations below 10-to the minus 5th power gram ion per liter in the presence of about 10-.0001 gram ion per liter of ceric ion. Although no suitable method could be found in the literature, the reported fluorescence of Ce(III) solutions suggested the development of a fluorometric technique. The technique developed, while unsuitable for dosimetry, does provide a method for the determination of a range of various ion concentrations, either in the absence or presence of ceric ion, not covered by any other analytical technique.

AD-617 034 Div. 4/4, 25/5

Uppsala Univ. (Sweden).
CHEMICAL SUBSTITUTION TREATED BY PARTITIONING IN THE HUCKEL APPROXIMATION,
by John E. Harriman. 3 Aug 64, 9p
Unclassified report

Pub. in Journal of Chemical Physics v42 n7 p2412-9 Apr 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Substitution reactions, Quantum mechanics), (*Statistical mechanics, Substitution reactions), Molecules, Atomic orbitals, Matrix algebra, Hamiltonian.

A scheme is presented for the discussion of the effects of chemical substitution on one-electron energies and LCAO molecular orbitals in the simple Huckel approximation. The method is based upon a partitioning of the Hamiltonian matrix corresponding to the physical division of the system into molecule and substituent interacting through one bond. Graphical methods are developed and a series of hypothetical substituted benzenes are considered as examples. (Author)

AD-617 035 Div. 4/4, 15/1

Theoretical Chemistry Inst., Univ. of Wisconsin, Madison.
GAUGE INVARIANCE OF THE HARTREE-FOCK APPROXIMATION,
by Saul T. Epstein. 16 Oct 64, 2p
Grant NsG275 62
Unclassified report

Pub. in Journal of Chemical Physics v42 n8 p2897-8 Apr 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Invariance, Potential theory), (*Potential theory, Invariance), (*Atomic energy levels, Potential theory), Calculus of variations, Perturbation theory, Transformations(Mathematics).

(i) Gauge invariance in the presence of nonlocal potentials is reviewed. It is shown that the uncoupled Hartree-Fock method is not gauge invariant. (ii) Gauge invariance of variational calculations is reviewed and it is shown that the coupled Hartree-Fock approximation is gauge invariant. (iii) A procedure for choosing a best gauge is suggested and in a special case is shown to reduce to a method recently proposed by Karplus and Kolker. (Author)

AD-617 050 Div. 4/3

Polytechnic Inst. of Brooklyn, N. Y. Dept. of Chemistry.
PREPARATION AND POLYMERIZATION OF S-, O-, AND N-VINYL DERIVATIVES OF CARBONIC ACID. UNSATURATED CARBONIC ACID DERIVATIVES. II,
by C. G. Overberger, H. Ringsdorf, and N. Weinshenker. 22 Jun 62, 8p
Contract DA49 193MD2032
Unclassified report

Pub. in Journal of Organic Chemistry v27 p4331-7 Dec 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Carbon dioxide, Carboxylic acids), (*Carboxylic acids, Preparation), Organic nitrogen compounds, Organic sulfur compounds, Organic oxygen compounds, Polymerization, Physical properties, Thiols, Formates, Amines, Chlorine compounds,

This paper describes the preparation, physical properties, and homopolymerization of several vinyl carbamates, vinyl thiolcarbamates, and vinyl thiolcarbonates. These monomers were prepared by the dehydrochlorination of the corresponding beta-chloroethyl compounds which were prepared by the reaction of (A) beta-chloroethyl chloroformate or B-chloroethyl chlorothiolformate with amines, alcohols, or mercaptans; (B) ethylene sulfide with chloroformates or chlorothiolformates; or (C) chlorothiolformates with beta-chloroethylamines or N-substituted ethyleneimines. (Author)

AD-617 067 Div. 4/3
CFSTI Prices: HC$2.00 MF$0.50

Tulane Univ., New Orleans, La.
PHYSICAL AND PREPARATIVE STUDIES OF TRANSITION METAL CHELATES.
Interim technical rept. for Dec 63-Aug 64,
by R. D. Archer. Apr 65, 33p
Contract AF33 615 1043, Proj. 7023, Task 702302
ARL 65-70

Unclassified report

Descriptors: (*Metalorganic compounds, Complex compounds), (*Synthesis(Chemistry), Metalorganic compounds), (*Physical properties, Metalorganic compounds), Magnetic properties, Nickel compounds, Molybdenum compounds, Tungsten compounds, Transition elements, Metals, Ketones, Amines, Magnetic properties, Band spectrum, Absorption specturm, Molecular structure.

The partial paramagnetism of several nickel (II) unsaturated Beta-ketoamine complexes has been found to be due to decomposition and water effects. Several other ketoamine complexes have been prepared, but none has been found suitable for vapor phase chromatography. A new 8-hydroxyquinolato complex of molybdenum has been isolated and the isomers of trichlorotripyridinemolybdenum (III) have been studied. Investigations of tungsten (III) and -(IV) complexes are in progress. Calculations of absorption band spectra for several trifluoromethyltetrazolyl complexes have been made and structures determined. (Author)

AD-617 104 Div. 4/4, 14/6
CFSTI Prices: HC$2.00 MF$0.50

Monsanto Research Corp., Everett, Mass.
CHEMILUMINESCENT SYSTEMS.
Technical rept. no. 4, 1 Mar-31 May 65,
by Abraham W. Berger. 25 Jun 65, 49p
Rept. no. MRB3009Q4
Contract Nonr451100, Proj. NR356 464, ARPA Order 299

Unclassified report

See also AD-613 013.

Descriptors: (*Luminescence, Organic materials), (*Organic materials, Luminescence), (*Photochemistry, Luminescence), Oxidation, Organic solvents, Indoles, Carboxylic acids, Fluorescence, Sulfoxides, Formamides.

Another functional class of organic materials, electronegatively substituted vinyl compounds, have been observed to yield relatively bright chemiluminescence in autoxidation reactions in basic, aprotic polar solvents. 4-Dimethyl amino benzoin has been found to produce a peak emission intensity significantly greater than that of benzoin. The relative emission intensities of indoles are orders of magnitude greater in aprotic solvents than in aqueous solution. For 2,3-dimethylindole this ratio is 1,000,000. Luminescence spectra have been obtained for benzoin, 2,3-dimethylindole and indole-5-carboxylic acid as a function of degree of reaction and base concentration. The observed chemiluminescence spectrum for benzoin oxidation corresponds to the fluorescence spectrum of benzil although benzil fluorescence has not been observed in the luminescence spectrum of oxidized benzoin solutions. The chemiluminescence spectrum of 2,3-dimethylindole corresponds to the fluorescence spectrum of a stable reaction product. The chemiluminescence spectrum of indole-5-carboxylic acid is similar to that of 2,3-dimethylindole but does not correspond with the fluorescence spectrum of any observed (stable) product. (Author)

AD-617 120 Div. 4/4, 27/3
CFSTI Prices: HC$2.00 MF$0.50

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
THE GENERATION OF CHARGED COLLOIDS FOR ELECTRIC PROPULSION VIA HETEROGENEOUS CONDENSATION IN VACUUM OF METAL VAPORS ON A SURFACE.
Final rept. for 20 Jun 60-19 Dec 63,
by Bernard Hornstein. Mar 64, 44p
Rept. no. RMD-2049-F
Contract AF49 638 924, Proj. 9752, Task 37521
AFOSR 65-0925

Unclassified report

Descriptors: (*Colloids, Electric propulsion), (*Electric propulsion, Space propulsion), (*Condensation, Colloids), Particle size, Metals, Vapors, Vapor plating, Vacuum apparatus.

As an approach to the in situ generation of charged colloids for electric propulsion, a heterogeneous condensation method was investigated. The method comprised two distinct steps; first, the formation of neutral particles by the controlled vacuum deposition of metal vapor onto a solid substrate, and second, the inductive charging and electrostatic separation of the particles from the substrate by a strong electric field. Particles ranging in diameter from below 50 to more than 500 Angstroms were readily formed by condensing lead, silver, and copper vapors upon plastic or carbon substrates. Background pressures were in the 0.00001 torr range, substrates were at room temperature or 300 C, vapor beam intensities at the substrate were about 10 to the 15th power atoms/sec cm sq, and deposition times varied from about 2 seconds to 200 seconds. Some experiments with a time-of-flight particle removal and detection system gave evidence that particles had been extracted from the substrate, acquiring charge-to-mass ratios up to 3000 coulombs per kilogram. If such particle charging and removal had in fact occurred, only a small fraction of the total deposit could have been involved. (Author)

AD-617 147 Div. 4/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
ELEMENTARY PROCESSES OF HIGH-ENERGY CHEMISTRY,
by V. L. Talroze and E. L. Frankevich.
19 May 65, 8p FTD-TT-65-75
TT 65-62538

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Vestnik, v33 n7 p113-4 1963.

Descriptors: (*Chemistry, USSR), Symposia, Gases, Plasma medium, Reaction kinetics, Ions, Excitation, Solids, Liquids, Free radicals, Quantum mechanics, High temperature research.

From the 18th to the 22nd of March in Moscow in the Institute of Chemical Physics of the Academy of Sciences of the USSR there was held a symposium on the elementary processes of high-energy chemistry. During the sessions there were discussed the following general problems: elementary processes in gases, elementary processes in liquids and solids (with the participation of excitations states of free radicals and ions), and elementary processes in quantum generators.

AD-617 165 Div. 4/2, 4/4
CFSTI Prices: HC$1.00 MF$0.50

Colorado Univ., Boulder.
HALOGENOID COMPLEXES.
Progress rept. no. 7, 30 Sep 64-1 Apr 65,
by R. N. Keller. 1 Apr 65, 3p
Grant DA ARO D31 124G198, Proj. 3292C
Unclassified report

See also AD-447 819.

Descriptors: (*Acids, Dissociation), (*Halides, Complex compounds), (*Complex compounds, Reduction(Chemistry)), Hydrogen compounds, Cyanides, Cyanates, Thiocyanates, Nitrides, Selenium compounds, Entropy, Enthalpy, Cobalt compounds, Ammonium compounds, Copper compounds, Reaction kinetics.

A very careful and exact determination of dissociation constants was completed for the following pseudo-halic acids: HCN, HOCN, HSCN, HN3, and HSeCN. The pKa values for these acids at 20C are: HCN, 9.36 ± .01; HOCN, 3.70 ± .02; HSCN, 0.96 ± .6; HN3, 4.70 ± .02; HSeCN, <<1. Preliminary data were obtained for relative rates of reduction of Co(NH3)5X(2+) ions (where X = Cl, Br, I, NCS, N3 etc.,) by Cr(2+). Approximate relative rates of 1:3:11 were found for the chlorine, bromine, and iodine complexes, respectively. When halogenoid ions such as N3(-) or SCN(-) are used in these reactions, rather inexplicable results were obtained so far. This study is being pursued further. A compound recently reported in the literature, presumably (Et4N)2Cu(NCO)4, has properties entirely different from this compound. This disagreement is being resolved. (Author)

AD-617 204 Div. 4/4

National Bureau of Standards, Washington, D. C.
TRANSITION PROBABILITIES FOR PERMITTED AND FORBIDDEN LINES OF Si X, FeXIV AND Fe X (1),
by R. H. Garstang. 1962, 10p
Unclassified report

Pub. in Annales d'Astrophysique v25 n2 p109-17 Mar-Apr 1962(Copies available only to DDC users)
Sponsored by ARPA.

Descriptors: (*Electron transitions, Probability), (*Silicon, Electron transitions), (*Iron, Electron transitions), (*Selection rules, Electron transitions), Atomic energy levels, Line spectrum.

Transition probabilities were calculated for forbidden transitions within the 2s22p and 2s2p2 configurations and for permitted transitions in the array 2s22p - 2s2p2 of Si X. The energy levels of the 3s3p2 and 3s23d configurations in Fe XIV were predicted by extrapolation along the isoelectronic sequence. Transition probabilities were calculated for forbidden transitions within the (3s3p2 + 3s23d) configurations and for permitted transitions in the arrays 3s23p - 3s3p2 and 3s23p - 3s23d of Fe XIV. Some preliminary results are given for the 3s23p5 - 3s3p6 and 3s23p5- 3s23p43d arrays in Fe X. The effect of departures from L,S, coupling due to spin-orbit interaction and configuration interaction is discussed. (Author)

08. Earth Sciences and Oceanography

AD-616 462 Div. 2/5, 30/5

Dallas Seismological Observatory, Southern Methodist Univ., Tex.
CONTINUOUS TEMPERATURE-LOGGING EQUIPMENT.
Revised ed.,
by Gene Simmons. 11 Jan 65, 4p
Grant AF AFOSR418 63
Unclassified report

Pub. in Journal of Geophysical Research v70 n6 p1349-52 15 Mar 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 19 Oct 64.

Descriptors: (*Thermistors, Well logging), (*Well logging, Thermistors), Electrical equipment.

Temperature logging of boreholes as a continuous function of depth yields more information than measurements made at discrete depths and requires no more time. Continuous-logging equipment is described that has a resolution of about 0.01C and is suitable for use to depths of at least 3 km. A balanced Wheatstone bridge, strip chart recorder, and thermistor are used to measure temperature. The depth indicator and recorder chart are driven through selsyns by the cable. (Author)

AD-616 475 Div. 2/6

Geophysical Inst., Univ. of Alaska, College.
THE EFFECT OF SMALL ISLANDS OF TELLURIC CURRENTS.
Revised ed.,
by Daniel W. Swift and Eugene M. Wescott.
6 Jul 64, 6p
Contracts AF19 604 6180, AF19 628 2779
Unclassified report

Pub. in Journal of Geophysical Research v69 n19 p4149-54 Oct 1 64 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript received 1 May 64.

Descriptors: (*Geophysics, Electric fields), (*Electric fields, Geophysics), Polarization.

The telluric current data of Macquarie Island show complete polarization of the induced electric field. This phenomenon can be explained by assuming that Macquarie Island is an insulator imbedded in the highly conducting sea with a uniform electric field over the dimensions of the island. The theory and data show the electric field to be perpendicular to the long axis of the island. The magnetic component perpendicular to the electric field correlates with the electric field very well, suggesting that the small island does not affect the frequency response between the magnetic and electric fields. (Author)

AD-616 476 Div. 2/10

Seismological Lab., Calif. Inst. of Tech., Pasadena.
ATTENUATION OF SEISMIC ENERGY IN THE UPPER MANTLE,
by Don L. Anderson, Ari Ben-Menahem, and C. B. Archambeau. 6 Oct 64, 8p
Contract AF49 638 1337
Unclassified report

Pub. in Journal of Geophysical Research v70 n6 p1441-8 Mar 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismic waves, Attenuation), (*Structural geology, Seismic waves), Seismographs, Earthquakes, Fourier analysis.

The amplitude attenuation and phase dispersion for Love and Rayleigh waves in the period range 50 to 300 sec is determined from two earthquakes by digital techniques. A distribution of Q, or anelasticity, is determined for the upper mantle which satisfies the amplitude decay data for Love and Rayleigh waves and which is consistent with available body wave data. An argument is made for a longitudinal wave Q of about 2.4 to 2.6 times the Q for shear waves. This implies that very small losses are involved in pure compression compared to the losses in shear. This is an argument against the importance of certain mechanisms, such as thermoelastic losses, in the mantle. The Q for shear waves in the upper 400 km of the mantle seems to vary from about 50 to about 150. The Q for mantle Rayleigh waves is greater than the Q for mantle Love waves, both theoretically and experimentally. However, it is predicted that QR becomes less than QL at some period shorter than 50 sec, the crossover period being diagnostic of the thickness of the 'Q crust' or lithosphere. (Author)

AD-616 495 Div. 2/9, 2/3

Washington Univ., Seattle. Dept. of Atmospheric Sciences.
NET RADIATION OVER FAST SEA ICE DURING SPRING BREAK UP AT PT. BARROW, ALASKA,
by B. J. Lieske. 21 May 65, 11p
Technical rept. no. TR-12
Contract Nonr47724, Proj. NR307 252
Unclassified report

Pub. in Science in Alaska. Proceedings of Alaskan Science Conference (15th) College, Alaska, 31 Aug-4 Sep 64, p52-60.

Descriptors: (*Seas, Solar radiation), (*Solar radiation, Seas), (*Alaska, Seas), Snow, Ice, Temperature, Thermal conductivity, Sea water, Melting, Oceans.

The warming and deterioration of snow-covered shore-fast sea ice at Pt. Barrow in 1963 commenced in late March by thermal conduction from the bottom and in May was by thermal conduction from the overlying snow. The conduction rate and sign are controlled chiefly by the net total radiation exchange at the snow surface, and internal absorption of short wave radiant energy by the ice is negligible until the depth of the snow is less than 25 cm. Cloudiness in May averaged 89% and contributed towards the positive value of net total radiation. The melting of ice in harbors and rivers could be greatly hastened in spring by removal of the overlying snow cover. It seems likely that ponding develops on sea ice in those places where the snow has the least depth. (Author)

AD-616 582 Div. 2/6
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
POLAR MAGNETIC, AURORAL, AND IONOSPHERIC PHENOMENA,
by E. H. Vestine. 10 Mar 60, 16p
Rept. no. P-1940
Unclassified report

To be submitted for publication to the International Symposium on Magneto-Fluid Dynamics.
Prepared for presentation to the Rocket and Satellite Research Panel, 17 Feb 60.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Magnetic storms, Polar regions), (*Polar regions, Magnetic storms), (*Upper atmosphere, Magnetic storms), (*Aurorea, Magnetic storms), Terrestrial magnetism, Magnetic fields, Electric fields, Particles, Radiation belts, Invariance, Integral equations, Satellites(Artificial).

Studies of particles and fields in the upper atmosphere of interest in rocket and satellite investigations are described. Integral variants proposed by Longmire and Rosenbluth are applied to auroral particles assumed trapped in the geomagnetic field. These are successfully used, together with computations of the geomagnetic field above the earth, to calculate theoretical auroral isochasms and the northern and southern auroral zones. The lines of force defining the latter intersect the equatorial plane in a nearly circular oval 6.6 to 6.8 earth radii in radius. Possible causes of the aurora, magnetic disturbances, and the outer Van Allen radiation belt are discussed. A theory of auroral morphology based on the stability considerations of plasmas is briefly outlined. (Author)

AD-616 616 Div. 2/5

Wilson, Nuttall, Raimond Engineers, Inc., Chestertown, Md.
OBSERVING, ANALYZING, AND FORECASTING THE STATE OF THE GROUND.
Rept. for 12 Jun 63-12 Jun 64,
by W. C. Grenke. May 65, 230p Rept. no. 3-112
Contract DA22 079eng354
Unclassified report

Available from Waterways Experiment Station, Vicksburg, Miss. $3.00.

Descriptors: (*Soils, Surface properties), Moisture, Temperature, Soil mechanics, Meteorological parameters, Trafficability, Terrain.

A study was made to determine the feasibility of developing an integrated system for observing, analyzing, and forecasting the state of the ground. The study relied chiefly on an extensive literature review, a worldwide questionnaire survey, and interviews with personnel of U. S. civilian and military agencies with an interest in the subject. It was found that the most widely useful indicators of the state of the ground were soil moisture content, soil temperature, and soil strength. It was further found that while information of this type is being collected at numerous sites around the world, there is little evidence of standardization of instruments or depths and frequencies of observations. Suitable methods are presently available for developing an integrated state-of-the-ground system, but improvements in the methods are desirable. Three systems are suggested, one for international use, one for civilian use in this country, and a third for U. S. military use on a worldwide basis. (Author)

AD-616 737 Div. 2/8
CFSTI Prices: HC$3.00 MF$0.75

Massachusetts Inst. of Tech., Cambridge. School of Engineering.
ADSORPTION AND FRICTION BEHAVIOR OF MINERALS IN VACUUM.
Phase rept. no. 2 on Research in Earth Physics,
by Leslie G. Bromwell. Mar 65, 96p
Rept. no. R-64-42
Contract DA22 079eng330, Proj. 1V0 14501B52A30, ARPA Order 400
Unclassified report

Descriptors: (*Quartz, Physical properties), (*Soil mechanics, Vacuum), (*Friction, Minerals), (*Adhesion, Minerals), Vacuum apparatus, Impurities, Surface properties, Reviews, High-temperature research, Pressure, Surfaces, Particles.

The report presents theoretical considerations on the adsorption and friction behavior of soils under high vacuum and extreme temperature conditions. It includes an extensive literature survey, particularly in the fields of surface chemistry and physics, adsorption, and friction. The importance of using clean, reproducible surfaces for surface studies is demonstrated. The necessity of clean ultrahigh vacuum test conditions for producing and maintaining clean surfaces is emphasized. The relationship between atomic forces and surface energy and the friction and adhesion between solid surfaces is discussed. A theoretical relationship between adsorption energy and the temperature and pressure required to remove adsorbed layers is derived. The frictional behavior of quartz is considered in detail. It is concluded that significant increases in the coefficient of friction, and thereby the shear strength, of particular mineral systems will result if adsorbed contaminants are removed. However, in the absence of a mechanism for producing a large contact area, significant cohesion will not develop. (Author)

AD-616 796 Div. 2/9, 30/3

Scripps Institution of Oceanography, Univ. of California, La Jolla.
HERMETICALLY-SEALING SEAWATER SAMPLER,
by Rudolf H. Bieri. 10 Sep 64, 7p
Contract Nonr221623, Proj. NR083 005
Unclassified report

Pub. in Journal of Marine Research v23 n1 p33-8 Jan 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seawater, Samplers), Hermetic seals, Oceanographic equipment, Vacuum apparatus, Aluminum, Copper, Containers, Gases.

The paper describes a device that seals samples of seawater in situ in an aluminum or copper tube in millimeter quantities such that the dissolved gases are retained and can be transferred to vacuum systems without either the loss of the contained gases or the introduction of air. The instrument has been tested to depths of 4000 m in the open ocean under modestly harsh conditions. (Author)

AD-616 826 Div. 2/9

Wisconsin Univ., Madison. Dept. of Meteorology.
ON THE ESTIMATION OF LAKE DEPTH FROM THE PERIOD OF THE SEICHE.
Technical rept.,
by Ronald Stewart. Dec 64, 3p Rept. no. TR-17
Contract Nonr120207, Proj. NR387 022
Unclassified report

Pub. in Limnology and Oceanography v9 n4 p606-7 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lakes, Depth finding), (*Depth finding, Lakes), Lake waves, Measuring devices(Electrical + electronic), Electrical conductance, Hydrology, Wisconsin.

Seiche periods on a group of Wisconsin lakes were measured by an electrical conductivity method in an effort to verify Merian's formula for estimating mean

depths. On the basis of this study, the use of Merian's formula provides an estimate of mean depth with an error of less than 1 m. for lakes that vary between 2 and 30 m. in mean depth. (Author)

AD-616 901 Div. 2/5
CFSTI Prices: HC$4.00 MF$1.00

Naval Postgraduate School, Monterey, Calif.
A STUDY OF MARKED SAND MOVEMENT ON DEL MONTE BEACH, MONTEREY BAY, CALIFORNIA.
Master's thesis,
by Clyde Gilbert Hohenstein, James Walter Jaeger, and David Lynn Jones. 1965, 140p
Unclassified report

Descriptors: (*Soil mechanics, Beaches), Sand, Motion, Seacoast, California, Tracer studies, Marine geology.

The movement of fluorescent-coated sand on Del Monte Beach, Monterey Bay, California was traced for a three-week period during February and March, 1965. In order to speed analysis of hundreds of sediment samples, a rapid volumetric measurement was developed to replace the standard weight measurement in textural analysis. Marked sand grains in different size ranges were found to move in different directions, both along and across the beach. No dominant longshore drift occurred. The observed movement of the sand correlated with the natural sand texture, beach profile changes, and the presence of cusps. (Author)

AD-616 906 Div. 2/9, 2/7
CFSTI Prices: HC$3.00 MF$0.75

Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
OCEANOGRAPHY AND METEOROLOGY OF THE GULF OF MEXICO.
Progress rept.,
by Willis E. Pequegnat and Leo Berner, Jr.
Jun 65, 100p Ref-65-17T
Contract Nonr211904, Projs. NR083 036, 286
Unclassified report

Descriptors: (*Oceanology, Mexico Gulf), (*Marine meteorology, Mexico Gulf), (*Mexico Gulf, Oceanology), Marine geophysics, Geochemistry, Oceanographic equipment, Fouling.

This report gives a summary of some of the Texas A and M oceanographic research on the Gulf of Mexico which has been carried on during the past two years. Included are reviews of work in physical oceanography, geophysics, geology, geochemistry, chemistry, instrumentation, and biofouling. Attention is called to the fact that numerous special reports have been issued by individual investigators that discuss specific research activities in greater detail. The field work carried out aboard the R/V ALAMINOS is summarized; publications, papers, and reports resulting from the work are presented; and a listing of personnel who have worked on the project is given. (Author)

AD-616 940 Div. 2/8, 4/2, 25/2

Army Electronics Lab., Fort Monmouth, N. J.
ORTHOPYROXENE AND CLINOPYROXENE POLYMORPHS OF CoGeO3,
by A. Tauber and J. A. Kohn. 16 Apr 64, 10p
Unclassified report

Pub. in The American Mineralogist v50 p13-21 Jan-Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Minerals, Synthesis(Chemistry)), (*Cobalt compounds, Minerals), Germanium compounds, Oxides, Phase studies, X-ray diffraction analysis, Single crystals, Crystal structure.

Solid-state reaction of CoO with GeO2 has yielded two cobalt metagermanate (CoGeO3) phases. X-ray diffraction shows an orthohombic form analogous to the orthopyroxene enstatite: a=18.77A, b=8.99, c=5.35, Pbca; and a monoclinic phase analogous to the diopside-augite clinopyroxenes: a=9.64A, b=8.99, c=5.15, beta=101 degrees 10', C2/c. Monoclinic single crystals were grown from the melt. The orthorhombic structure is stable below 1351C. and the monoclinic form is stable above this temperature. A minor amount of the monoclinic phase coexists metastably down to 1241C. The orthorhombic form transforms to the monoclinic rapidly and completely above 1351C. Lengthy runs were unsuccessful in bringing about the reverse transition. CoGeO3 melts congruently at 1377C. (Author)

AD-616 989 Div. 2/9, 2/8
CFSTI Prices: HC$3.00 MF$0.75

Naval Postgraduate School, Monterey, Calif.
ENVIRONMENTAL ANALYSIS OF THE SEDIMENTS OF SOUTHERN MONTEREY BAY, CALIFORNIA.
Master's thesis,
by Gordon M. Monteath, Jr. 1965, 95p
Unclassified report

Descriptors: (*Ocean bottom sampling, Petrography), (*Petrography, Marine geology), (*Marine geology, Pacific Ocean), Minerals, Petrology, Geochemistry, Sedimentation, Seacoast, California, Economic geology, Maps.

Thirty-eight bottom sediment samples were collected in southern Monterey Bay; these were analyzed for their textural and constituent mineral compositions using coarse fraction analyses. Nine constituents were recognized and their percentage concentrations in the various size fractions of each sample were estimated. Charts of the bay showing the sediment texture and the percentage of each constituent in the sediments were prepared. The distribution of the constituents and the relationship of each given constituent concentration to the sediment texture and to the concentration of other constituents were examined, and yielded the following results: the constituent concentrations were found to lie in belts roughly paralleling the shoreline. In general, terrigenous constituents (quartz, feldspar, and mafics) occurred in highest concentrations along the coast in areas of medium to fine sand, whereas pelagic constituents (foraminifera and other organics) and authigenic minerals (glauconite and phosphorite) were most highly concentrated in silts and clays occupying the outer continental shelf. The area of authigenic mineral occurrence is considered to be essentially a non-depositional environment. (Author)

AD-616 998 Div. 2/9, 13/4
CFSTI Prices: HC$3.00 MF$0.75

Army Coastal Engineering Research Center, Washington, D. C.
CERC BULLETIN AND SUMMARY REPORT OF RESEARCH PROGRESS FOR FISCAL YEAR 1964, VOLUME I.
1964, 63p
Unclassified report

Descriptors: (*Oceanology, Seacoast), (*Seacoast, Engineering), Beaches, Erosion, Bibliography,

Tracer studies, Sedimentation, Transport properties, Probability, Water waves, Stability, Civil engineering.

Contents:
Establishment of coastal engineering research center
A selected bibliography and brief review of the theory and use of tracers in sediment transport studies
A theoretical distribution of waiting times for tracer particles on a sand bed (and Appendix)
Comparison of the Bretschneider relations between the distribution of the visible waves and the spectrum of the sea waves by analysis of wave records from the Deutsche Bucht
Stabilization of shingle alluvial shores by groins of full profile
Translation of 'Fundamentals of the Science on Sea Shore Evolution'
Progress reports on research sponsored by the Coastal Engineering Research Center.

AD-617 004 Div. 2/9, 30/3
CFSTI Prices: HC$1.00 MF$0.50

Scripps Institution of Oceanography, Univ. of California, La Jolla.
NEW TECHNIQUES IN UNDERSEA TECHNOLOGY,
by James M. Snodgrass. 10 Jun 65, 9p
Contract Nonr221623, Proj. NR083 005

Unclassified report

Pub. in 1965 IEEE International Convention Record or IEEE Spectrum.

Descriptors: (*Oceanographic equipment, Reviews), (*Underwater equipment, Bathythermographs), (*Bathythermographs, Microminiaturization(Electronics), Oceanology, Instrumentation.

The successful development of expendable instruments in oceanography is certainly one of the most exciting advances in the rapidly evolving technology of oceanography. It appears that microelectronics may be expecially well qualified in this field. The economics of ship operations and expediency tend to dictate this new development. (Author)

AD-617 039 Div. 2/10

Seismological Lab., Calif. Inst. of Tech., Pasadena.
A PROCEDURE FOR SOURCE STUDIES FROM SPECTRUMS OF LONG-PERIOD SEISMIC BODY WAVES,
by Ari Ben-Menahem, Stewart W. Smith and Ta-Liang Teng. 21 Oct 64, 33p
Contract AF49 638 1337; Grant AF AFOSR62 421

Unclassified report

Pub. in Seismological Society of America. Bulletin v55 n2 p203-35 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismic waves, Sources), Earthquakes, Spectroscopy, Seismological stations, Structural geology, Trigonometry.

The well-known first motion method of Nakano and Byerly is extended, generalized and combined with recent new ideas in body wave theory in order to set up a routine procedure for extracting source parameters from spectral analysis of isolated P and S pulses recorded at a net of standardized stations around a non-shallow source. The method consists of compensating the observed spectrums for instrumental and propagational effects. A combined study of the resulting radiation patterns, initial phases, and the initial amplitudes will render information regarding the spatial and temporal nature of deep and intermediate earthquake sources as seen through the spectral window of 10-100 seconds. The shorter periods can be used for source studies only if an accurate station correction is available. (Author)

AD-617 053 Div. 2/10

Acoustics and Seismics Lab., Univ. of Michigan, Ann Arbor.
AN APPLICATION OF THE DISCRIMINANT FUNCTION TECHNIQUE TO SEISMIC RECORDS,
by Emil H. Jebe and David E. Willis. 1964, 13p
Contract AF49 638 1170

Unclassified report

Pub. in Earthquake Notes v35 n3/4 p28-40 Sep-Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Seismology, Numerical methods and procedures), Functions, Seismic waves, Seismographs, Geophysics, Statistical analysis, Earthquakes.

A preliminary investigation was made of the possible application of the discriminant function approach for distinguishing between seismic events. This technique was first introduced to the scientific world in R. A. Fischer's now classical paper of 1936 (Annals of Eugenics, 7, 179, 'The Use of Multiple Measurements in Taxonomic Problems'). A recent paper (December 1962) by a Russian author has given an excellent exposition of the technique for another biological problem (A. A. Lubischew, 'On the Use of Discriminant Functions in Taxonomy,' Biometrics, 18, 455). The seismic differentiation problem is similar to the taxonomic problem in biology. Availability of sufficient data has been a limitation in this preliminary study. Specifically, the maximum shear-compressional wave (S/P) ratio at only six frequency bands has been used to estimate a linear discriminant. Three problems were set up for analysis using only two groups for comparison in each problem. Even with this limited input for the method, the results obtained are considered interesting. Thus, it appears worthwhile to pursue further this technique as suitable additional variables or measurements from the basic records become available for inputs to the analysis. No clearcut differentiation was obtained in any of the three problems. The overlap of the sample step functions for the best linear discriminant values for two of the problems was small. Correspondingly, the ratio of the maximized 'between group variation' for the discriminant values to the 'within group variation' as measured by the F statistic was fairly large. (Author)

AD-617 062 Div. 2/9
CFSTI Prices: HC$1.00 MF$0.50

Athens Univ. (Greece).
PLANCTONOLOGICAL SURVEY OF THE NORTH-AEGEAN SEA.
Technical rept. for 1 Jan-31 Dec 64,
by Vassili Kiortsis. 31 Dec 64, 19p

Unclassified report

Descriptors: (*Mediterranean Sea, Plankton), (*Plankton, Mediterranean Sea), (*Marine biology, Mediterranean Sea), Oceanographic data, Maps.

A planctonological survey in the North-Aegean sea was carried out in three different seasons during the years 1963-1964. Twenty standard seasonal stations were established and the collected plancton was studied qualitatively and quantitatively. Special emphasis is given to the meso-zoo-plancton. Indications are given concerning the geographic distribution, seasonal occurence and variation of many planctonic organisms. A list of the recorded species is also included. (Author)

AD-617 122 Div. 2/10, 25/1
CFSTI Prices: HC$2.00 MF$0.50

Institute of Science and Tech., Univ. of Michigan, Ann Arbor.
INVESTIGATION OF SHORT-PERIOD SEISMIC NOISE IN MAJOR PHYSIOGRAFHIC ENVIRONMENTS OF CONTINENTAL UNITED STATES.
Final technical rept. for 1 Sep 61-31 Dec 64,
by G. E. Frantti. Jun 65, 37p
Rept. no. 4711-22-F, 5178-47-T
Contracts AF19 628 200, AF49 638 1170,
Proj. 8652, ARPA Order 180 61, Tasks 865204, 2
AFCRL 65-406

Unclassified report

Descriptors: (*Seismology, Noise), (*Noise, Seismology), (*Acoustics, Seismology), Geophysics, United States, Noise analyzers, Extremely low frequency, Geology.

Measurements of spectral density levels of short-period seismic noise are obtained for points distributed throughout the continental United States and for a few non-North American locations. Noise amplitudes and gradients in the far field correlate on a regional basis with major physiographic provinces, as revealed by iso-particle-velocity contouring. The ensemble of space and time samples of noise is examined to illustrate the average spectrum and dispersion for three orthogonal components of ground-particle velocity in the range 0.25 to 100 cps. Probability distributions of noise amplitudes based on a collection of space averages and time averages are presented for several frequencies. The ratio of horizontal to vertical noise amplitude (H/Z) exceeds the theoretical value for simple Rayleigh waves and shows a frequency-dependent variation with regional geologic environment. (Author)

AD-617 148 Div. 2/10
CFSTI Prices: HC$3.00 MF$0.75

Rhode Island Univ., Kingston.
LOVE WAVE DIFFRACTION IN A VARIABLE THICKNESS SURFACE LAYER.
Scientific rept.,
by David Joseph Defanti and John E. Spence. Feb 65, 65p Rept. no. SR-5
Contract AF19 628 319, Proj. 8652, ARPA Order 180 62
Tasks 865203, 2
AFCRL 65-155 Unclassified report

Descriptors: (*Seismic waves, Diffraction), (*Diffraction, Seismic waves), Boundary value problems, Wave transmission, Reflection.

Consideration is given to the mixed boundary value problem of Love wave propagation in a solid layer over a solid half-space where the layer undergoes an abrupt change in thickness. Both the layer and half-space are considered to be homogeneous elastic media. Interest is focused on the amplitudes of the transmitted and reflected Love waves relative to the magnitude of the excitation, i.e., the transmission and reflection coefficients, for a range of both the 'strength' of the discontinuity (magnitude of change in thickness relative to layer thickness) and the layer thickness. Using a function-theoretic argument based on the Wiener-Hopf technique integral expressions for the total fields are obtained. The transmission and reflection coefficients are then extracted by a standard appeal to the calculus of residues. Both displacement amplitude and energy coefficients are displayed graphically. A comparison reveals that the results shown are in close agreement with those given by Knopoff and Hudson. However, a discrepancy does exist for intermediate values of crust thickness and is discussed in some detail. (Author)

AD-617 154 Div. 2/10
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
STUDY OF EARTHQUAKES AND EXPLOSIONS WITH THE AID OF MULTIPENDULUM SEISMOMETERS,
by B. K. Karpetyan. 19 May 65, 14p FTD-TT-65-80
TT 65-62539

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Sovet po Seismologii. Byulleten, n14 p122-7 1963.

Descriptors: (*Seismic waves, Explosions), (*Earthquakes, Seismic waves), Seismographs, Determination, USSR.

AD-617 194 Div. 2/9, 2/5
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
ICE ENGINEERING: GROWTH RATE OF SEA ICE IN A CLOSED SYSTEM.
Technical rept.,
by N. S. Stehle. Jun 65, 25p Rept. no. R-396
Proj. YF015 11 01 052

Unclassified report

Descriptors: (*Ice, Sea water), (*Crystal growth, Ice), Mathematical analysis, Surface properties, Mechanical properties, Strength, Laboratories, Tests, Salinity, Desalination.

A laboratory investigation was conducted of the growth rate and salinity characteristics of fresh water and sea ice under a variety of experimental conditions, in order to better understand the factors affecting growth rate, salinity, and brine drainage. The sea ice was produced in water of increasing salinity (a closed system), which produces ice that increases in salinity and generally has lower strength, poorer surface qualities, and a greater heterogeneity than natural ice. From these experiments, it was concluded that further tests and analyses should be conducted to determine the process of natural brine drainage and to find additional methods to accelerate it. Growth rate data of sea ice in a closed system, which was little affected by the increase in water salinity until three-quarters of the ice was frozen, fit general growth-rate equations. Mathematical analyses of growth-rate equations and data from flooded and natural sea ice should be continued to develop a family of curves for the field determination of sea ice growth rates. (Author)

09. Electronics and Electrical Engineering

AD-616 432 Div. 8/1

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CIRCULATOR SYNTHESIS.
Revised ed.,
by Jerald A. Weiss. 12 Oct 64, 8p
Unclassified report

Pub. in IEEE Transactions on Microwave Theory and Techniques vMTT13 n13 p38-44 Jan 1965 (Copies not available to DDC or Clearinghouse customers)
Prepared in cooperation with Worcester Polytechnic Inst., Mass.
Revision of manuscript submitted 20 Aug 64.

Descriptors: (*Waveguide circulators, Synthesis), Phase shifters, Microwave frequency.

A symmetrical three-port ring network composed of reciprocal T junctions and nonreciprocal phase shifters is analyzed theoretically to determine conditions under which it exhibits perfect circulation. All physically realizable T junctions are considered. It is found that many such junctions, combined with appropriate phase shifters specified by the theory, form perfect circulators. Among these are many cases for which the internal wave amplitudes are small and which require only very small amounts of nonreciprocal phase shift. Circulators designed in accordance with this model may offer appreciable advantages in insertion loss and bandwidth, as well as in mechanical characteristics such as size and weight, and in the possibility of adapting the design for special applications such as high-power capability, high-speed switching, etc. The nature of the model and the method of calculation are summarized. (Author)

AD-616 436 Div. 30/2

Lincoln Lab., Mass. Inst. of Tech., Lexington.
INVESTIGATION OF EDDY-CURRENT-INDUCED NONDESTRUCTIVE READOUT IN THIN-FILM MEMORIES,
by M. S. Maltz. 1965, 2p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1121-2 Mar 1965 (Copies not available to DDC or Clearinghouse customers)
Operated with support from the U. S. Air Force
See also AD-603 755.

Descriptors: (*Thin films(Storage devices), Display systems), (*Electric currents, Thin films(Storage devices)), Electromagnetic fields, Computer storage devices, Magnetic recording systems, Time, Geometry.

When a magnetic thin-film bit is switched, eddy currents arise, creating fields which tend to remagnetize the bit in its original direction. A structure in which these fields are strong enough to produce NDRO was given a preliminary investigation. The bits were nickel-iron 17-83 Permalloy, 50x50 mil by 500 A, evaporated onto a glass substrate. The structure layers were: bit line, word line, planar sense line, bit, glass, and word line. If the word drive pulse was 100 nsec long or less, the structure with the most unfavorable geometry gave stable NDRO at drive currents up to 10 times as large as the normal DRO value. Scale factors are displayed and applied to show that NDRO is possible with structures much smaller than the one tested. The eddy fields could even remagnetize partially demagnetized bits. When the eddy field was measured as a function of time and geometry, the time constant and magnitude of the decay was a sensitive function of the word linewidth and separation, varying between 76 and 191 nsec. Experimental and theoretical evidence was found for a rapid transient decay mode which precedes the slower decay mode observed in the experiments. (Author)

AD-616 438 Div. 7/2, 25/4, 25/3

Lincoln Lab., Mass. Inst. of Tech., Lexington.
LONGITUDINAL KERR EFFECT USING A VERY THIN Fe FILM,
by D. O. Smith. 1965, 2p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1120-1 Mar 1965(Copies not available to DDC or Clearinghouse customers).
Operated with support from the U. S. Air Force.

Descriptors: (*Magneto-optic effect, Metal films), (*Iron, Metal films), Dielectric films, Lighting equipment, Ferromagnetism.

Using known materials, the optimum magneto-optical light switch utilizing the longitudinal Kerr effect would operate at a wavelength of approximately 1 micron and be made from a very thin (D = 2pi (thickness/wavelength) < 1/10) Fe film placed on the surface of a mirror (tangential E=0) in an optical standing wave. A multilayer dielectric structure would be used to couple the incident light to the magnetic film and the maximum possible magnitude of the Kerr coefficient is calculated to be 0.034. This is about 10 times greater than for a thick Permalloy film operating at visible wavelengths. (Author)

AD-616 464 Div. 8/3, 15/1

Microwave Research Inst., Polytechnic Inst. Brooklyn, N. Y.
ON THE STABILITY OF LINEAR SYSTEMS,
by Dante C. Youla. 2 Jan 63, 4p
Grant AF AFOSR62 280
AFOSR 65-0622
Unclassified report

Pub. in IEEE TRANSACTIONS OF THE PROFESSIONAL TECHNICAL GROUP ON CIRCUIT THEORY vCT10 n2 Jun 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Linear systems, Stability), Differential equations, Circuits, Servomechanisms.

AD-616 510 Div. 8/7

RAND Corp., Santa Monica, Calif.
THE OPTIMUM DETECTION OF ANALOG-TYPE DIGITAL DATA,
by Edward Bedrosian. 28 Jan 60, 7p
Rept. no. P-1893
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Communication theory, Data transmission systems), Optimization, Pulse modulation, Signals.

AD-616 528 Div. 8/7
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.

THE TWO-FREQUENCY MEASUREMENT OF LINE-OF-SIGHT SPREAD CHANNELS,
by M. L. Burrows. 17 May 65, 29p
Technical note no. TN-1965-9
Contract AF19 628 500
ESD TDR-65-74

Unclassified report

Descriptors: (*Frequency, Measurement), Statistical functions, Noise(Radio), Oscillators, Signal-to-noise ratio, Phase-locked communication systems.

An analysis is carried out of the effects of various non-ideal circumstances on the two-tone method of measuring the two-frequency correlation function for microwave line-of-sight communication channels. These circumstances are the presence of both short-term and long-term instabilities of the signal sources, the presence of additive noise, and the use of discontinuous tones such as those available from a spinning satellite. It is shown that oscillator instability effects are removable by assigning the short-term carrier oscillator instabilities to the channel, using high quality modulating oscillators and including phase-lock tracking loops, that the effect of additive noise can be made negligible provided the signal-to-noise power ratio of the received tones is greater than about 6 db, and that the use of discontinuous slowly-switched tones is distinctly disadvantageous. A method of processing the received tones is suggested which automatically removes the large constant delay due to range, leaving only the frequency dependent part of the delay. (Author)

AD-616 546 Div. 8/4, 8/6
CFSTI Prices: HC$2.00 MF$0.50

Centre de Physique Electronique et Corpusculaire, Orsay (France).
GENERATION OF INFRAMILLIMETRIC WAVES BY MEANS OF ELECTRONIC BEAMS.
Technical rept. no. 5, 1 Jul-31 Dec 64.
31 Dec 64, 35p Rept. no. WR-1360
Contract AF61 052 715
RADC TR-65-245

Unclassified report

Descriptors: (*Electron beams, Waveform generators), (*Waveform generators, Millimeter waves), Electron guns, Electron tubes, Design, Delay lines.

It is desired to extend the state of the art of O-type carcinotron oscillators to the generation of submillimeter waves down to 0.3 mm. A 0.4 mm. tube was operated satisfactorily in C.W. condition. A few milliwatts were obtained on the band between 682 and 766 Gc/s. The overall design of guns and tubes was improved. High voltage handling can now be obtained over the ten kilovolts range.

AD-616 548 Div. 8/2, 25/3
CFSTI Prices: HC$4.00 MF$1.00

Microwave Associates, Inc., Burlington, Mass.
MILLIMETER WAVE COMPONENT DEVELOPMENT (BEAM-PLASMA AMPLIFIER).
Final rept. for Jan 63-Nov 64,
by Paul Chorney and Richard J. Madore. Apr 65, 139p
Contract AF30 602 2948, Proj. 5573, Task 557304
RADC TR-65-53

Unclassified report

See also AD-609 011.

Descriptors: (*Millimeter waves, Microwave amplifiers), (*Plasma physics, Microwave amplifiers), Microwave networks, Plasma medium, Microwave equipment, Electron beams, Density, Scattering, Test equipment-(Electronics), Waveguides, Gas discharges, Diffusion, Transport properties, Theory, Gases, Magnetic fields, Pressure, Xenon.

The requirements of plasmas for use in millimeter and sub-millimeter-wave beam plasma amplifiers are discussed. The criteria are described for determining the gas type and pressure in terms of the mean-free path of beam electrons. The theory of electron beam scattering is examined and it is found that electron-atom collisions dominate over electron-ion collisions. Extensive experimental studies of the PIG discharge are described. The parameters affecting the discharge such as pressure, magnetic field, and geometry are examined. A maximum value of magnetic field is found beyond which anomalous diffusion results in a decrease in plasma density. Gas pressures in excess of 50 x 0.001 torr do not result in higher plasma densities due to short mean-free paths in the PIG. The one- and two-hot-cathode mode of operation of the PIG is investigated. The two-hot-cathode mode results in a discharge much less sensitive to parameters such as magnetic field, cathode temperature and gas pressure. Extensive density measurements with various PIG dimensions show that plasma frequencies in the 2 mm range can be conveniently produced in xenon gas at pressures in the 30-50 x 0.001 torr range and discharge currents in the 3-4 range. It is observed that the generation of these plasmas is apparently independent of the discharge volume. (Author)

AD-616 554 Div. 8/2
CFSTI Prices: HC$3.00 MF$0.75

Western Microwave Labs., Inc., Santa Clara, Calif.
DEVELOPMENT OF A FAST SWITCHING, HIGH POWER DIGITAL PHASE-SHIFTER AT X-BAND.
Final rept.,
by Robert Addington. Jun 65, 81p
Contract AF30 602 3496

Unclassified report

See also AD-610 598.

Descriptors: (*Phase shifters, X band), Electronic switches, Radiofrequency power, Digital systems, Microwave equipment, Ferromagnetic materials, Standing wave ratios, Holmium compounds, Garnet, Performance(Engineering).

The development of a four-bit ferrite phase-shifter is reported. A method of designing a fast switching, latchable, ferrite switch of stripline construction is described. This method incorporates several new design techniques which are a direct product of this development program. The final data is presented for a high power, latchable digital phase-shifter and reference is made to the characteristics of its low power counterpart. (Author)

AD-616 562 Div. 8/2, 8/7
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON THE NOISE TEMPERATURE OF COUPLING NETWORKS,
by E. Bedrosian. 10 Feb 60, 3p Rept. no. P-1907

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Coupling circuits, Noise(Radio)), (*Noise-(Radio), Coupling circuits), Temperature, Networks, Waveguides, Transmission lines, Matched filters.

The relationship T = S/L + N(1-1/L) is derived where S is the noise temperature of the source, N is the temperature of the coupling network, T is the noise temperature at the output (under matched conditions), and L is the coupling-network power loss ratio, for a passive coupling network which is used to connect a source to a receiver.

AD-616 573 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE POTENTIAL OF ELECTRONIC DATA PROCESSING IN MUNICIPAL GOVERNMENT,
by E. F. R. Hearle. 26 Feb 60, 9p
Rept. no. P-1924-RC
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Data processing systems, Urban areas), (*Urban areas, Data processing systems), Communication theory, Data storage systems, Input-output devices, Punched cards, Magnetic tape, Computers, Computer logic, Decision making, Management engineering.

The major characteristics of electronic data processing equipment and the use of computers in solving municipal problems are explored. The fundamental functions performed by electronic data processing (EDP) equipment are discussed. These functions are: Input, to get information into the system; Processing, to manipulate the data according to specified rules; Storage, to file data, either temporarily or on a permanent basis; and Output, to present the results of the processing or the status of any data stored in the system.

AD-616 579 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SIXTY YEARS OF GROWTH IN COMPUTING AND DATA PROCESSING CAPABILITY,
by R. L. Petruschell. 8 Mar 60, 5p
Rept. no. P-1932
Unclassified report

Prepared for publication in Product Engineering (McGraw-Hill, New York).
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Computers, History), (*Data processing systems, History), Data storage systems.

A graph is presented that shows a 1:1,000,000 increase in the single-address speed of representative machines at particular points between 1900 and 1960, beginning with tabulating equipment and continuing to such electronic data processing machines as STRETCH and LARC. A second graph pictures the time-phased development of speed and storage capacity between 1951 and 1960, the single-address speed in thousands of operations per second being plotted against the directly addressable storage in thousands of characters; a character is defined as the total number of bits in the directly addressable storage divided by six. In most cases the addition of increments of speed and storage capacity did not take place simultaneously.

AD-616 584 Div. 7/5, 25/3, 27/3
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ELECTRICAL POWER FROM ROCKETS,
by J. H. Huth. 16 Mar 60, 15p Unclassified report
Rept. no. P-1944
Rept. prepared for presentation at the Semi-Annual Meeting of the American Rocket Society, Los Angeles, Calif., 9-12 May 60. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Electric power production, Rocket motors), (*Magnetohydrodynamics, Electric power production), (*Generators, Magnetohydrodynamics), (*Rocket motors, Electric power production), Theory, High-temperature research.

The paper discusses the characteristics of magnetohydrodynamic generators, as applied to ground-based chemical-rocket exhausts. Simple open-cycle units can have ultimate efficiencies up to 40 per cent, and can provide electrical power on very short notice. More specifically, rocket-powered MHD generators are suited to applications requiring hundreds or thousands of electrical megawatts for a few minutes. Within this range one can foresee power densities (including the magnet) of at least 250 kw/cu ft. The main problems center about developing suitable materials for operation near 2000 - 3000K. However, no moving parts are required in the MHD generator itself, where these temperatures manifest themselves. (Author)

AD-616 585 Div. 30/2
CFSTI Prices: HC$3.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON PROGRAMMING A HIGHLY PARALLEL MACHINE TO BE AN INTELLIGENT TECHNICIAN,
by A. Newell. 1 Apr 60, 52p Rept. no. P-1946
Unclassified report

Rept. prepared for presentation at the Western Joint Computer Conference, San Francisco, Calif., 3-5 May 60
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Descriptors: (*Artificial intelligence, Programming-(Computers)), (*Programming(Computers), Artificial intelligence), Theory, Data processing systems, Digital computers, Computers, Computer storage devices, Iterative methods, Programming languages, Input-output devices.

This paper speculates on how to program a machine that is suitable for construction with microelectronic components to be an intelligent technician. The point of departure i from a class of machines described by J. H. Holland in a concurrent paper entitled, 'On Iterative Circuit Computers Constructed of Microelectronic Components and Systems.' These machines consist of a regular lattice of active modules, each possessing both processing and memory functions. The goal is a machine with the problem solving capabilities of a smart human technical assistant, and the volume processing capabilities normally associated with digital computers. This goal is chosen because it coincides with many current developments. After discussing the eventual capabilities desired and the most striking features of Holland's machines, the speculation proceeds by considering the basic organization for information processing. This is followed by briefer treatments of the organization for problem solving, supervision, interpretation and production. (Author)

AD-616 594 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
LONG-RANGE CONSIDERATIONS IN DATA PROCESSING FOR STATE AND LOCAL GOVERNMENTS,
by John A. Postley. 6 Apr 60, 7p
Rept. no. P-1961-RC
Unclassified report

Descriptors: (*Data processing systems, Urban areas), (*Urban areas, Data processing systems), Information retrieval, Communication theory, Computers, Management planning.

The purpose of this paper is to try to indicate the major impact of future applications of data processing in state and local government, and some of the developments which foretell this impact. (Author)

AD-616 608 Div. 8/3
CFSTI Prices: HC$5.00 MF$1.25

Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
MINIMUM PEAK AMPLITUDE CONTROL,
by Frederick Marshall Waltz. May 65, 197p
Technical rept. no. TR-164, 6137-7-T
Contract DA36 039AMC3733E, Proj. 1P021101A042, Task 1P021101A042 01, 1P021101A042 02
Unclassified report

Descriptors: (*Control systems, Optimization), (*Signals, Control systems), (*Optimization, Control systems), Functional analysis, Linear systems, Calculus of variations, Dynamic programming.

This report considers a class of optimal control problems in which the input signal to a given system is to be chosen so as to cause the output of the system to satisfy specified conditions and so that the peak value of the input over the operating interval is a minimum. For cases in which the given system is linear, a theorem guaranteeing the existence of an optimal input and a theorem giving the form of this optimal input are presented, as well as computational algorithms for obtaining numerical values of optimal inputs. Two approaches to minimum peak amplitude problems in which the given system in nonlinear are presented: the first makes use of a certain time-optimal problem, and the second involves a limiting process using an L sub p-space norm in place of the originally-specified cost functional. (Author)

AD-616 612 Div. 8/2, 26/1
CFSTI Prices: HC$2.00 MF$0.50

Westinghouse Electric Corp., Washington, D. C.
500 WATT SILICON POWER TRANSISTOR.
Quarterly rept. no. 7, 1 Feb-30 Apr 65.
30 Apr 65, 26p
Contract NObsr91001, Proj. SR0080304, Task 9347
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Silicon, Transistors), Semiconductor devices, Electrical properties, Electric connectors, Encapsulation, Halocarbon plastics, Gaskets, Production.

Additional state-of-the-art samples were delivered during the period (see AD-612 496). The electrical characteristics of these units are reported and discussed. A working process was developed for collector contacting. This technique is described in detail. (Author)

AD-616 618 Div. 8/4

Centre National d'Etudes des Telecommunications (France).
RESEARCH ON GRIDISTORS.
Progress rept. no. 5 (Final), 16 Aug-31 Dec 64,
by P. Durand, R. Gicquel, and P. Briere. 30 Mar 65, 35p
Contract N62558 4060
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Electron tubes, Semiconductor devices), (*Semiconductor devices, Electron tubes), France.

The gridistor is a structure with horizontal channels, a 'comb' structure (S. Teszner and R. Gicquel. 'The gridistor - a new field effect device', Proc. of the IEEE, Special issue on integrated electronics, Dec. 1964). The 'brush' type structure with vertical channels was studied earlier. The gridistor has a grid, and a cathode and anode fingers. Parameters for the structure included 78 channels, 15 microns wide, with 20-sq micron cross section and 30-micron length after diffusion. The epitaxial layer was doped with n-type phosphorus and the substrate with p-type boron.

AD-616 620 Div. 30/2
CFSTI Prices: HC$5.00 MF$1.00

Hughes Aircraft Co., Fullerton, Calif.
ASSOCIATIVE PROCESSING TECHNIQUES STUDY.
Final rept. for 1 Jan-31 Dec 64,
by H. H. Love and D. A. Savitt. Apr 65, 163p
Rept. no. FR-65-11-18
Contract AF30 602 3279, Proj. 5581, Task 558109
RADC TR-65-32 Unclassified report

Descriptors: (*Data processing systems, Analysis), (*Special purpose computers, Processing), Computers, Data, Computer storage devices, Control sequences, Programming(Computers), Programming languages.

The concept of a general-purpose computer, called the Association-Storing Processor (ASP), is defined, and a model computer, based upon the concept, is described. The computer characteristics of simplified programming and efficient processing of non-numerical problems were the dominating considerations in the ASP concept development. The concept is concerned with a way to represent data and to state problem procedures, along with a corresponding algorithm for obtaining problem solutions. The data representation of the ASP concept is based upon the idea of explicitly storing the nature of the association between data items, together with the associated items, as a data relation. A data structure is created with this data relation as the basic element of data, and data items are addressed by their context of relations within the structure. Problem procedures are stated in terms of a single instruction type which has been designed to directly accomplish the solution of many problems in the area of fact retrieval applications. For these problems a solution is obtained without the need to write a specification of procedure (i.e., a program). This same single instruction type has been made the basis of a programming approach which provides general purpose (numerical and non-numerical) processing capability. (Author)

AD-616 635 Div. 8/2, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Airborne Instruments Lab., Deer Park, N. Y.

FREQUENCY MULTIPLIER,
Quarterly rept. no. 1, 1 Dec 64-28 Feb 65,
by G. P. Kurpis and J. J. Taub. 28 Feb 65, 30p
Contract DA28 043AMC00438E, Proj. 1P6 22001A058
Unclassified report

Descriptors: (*Frequency multipliers, Design), (*Semiconductor devices, Frequency multipliers), Transistors, Varactor diodes, Oscillators, Waveguides.

The component arrangements suitable for developing a solid-state multiplier chain that has an output power of 20 microwatts at 100 Gc has been studied. The most suitable arrangement uses a 20.833-Mc crystal-controlled transistor oscillator multiplied and amplified to deliver 4 watts at 104.166 Mc. This is then multiplied by 80 means of step-recovery diode circuits. The remaining multiplication by 12 is accomplished with varactors using one tripler and two doublers. The design approach to be used for each of the varactor and step-recovery diode circuits concludes the report. (Author)

AD-616 644 Div. 8/7
CFSTI Prices: HC$6.00 MF$1.25

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
STUDY AND ANALYSIS OF SIGNAL DISPLAY AND BANDWIDTH COMPRESSION TECHNIQUES.
Final rept. for 15 Jun 64-14 Jun 65,
by Berry O. Pyron and Frank R. Williamson, Jr.
14 Jun 65, 207p Rept. no. A-791/T1
Contract DA49 092AR052, Proj. A791
Unclassified report

Continuation of Contract DA49 092AR021.

Descriptors: (*Speech recognition, Analysis), (*Speech compression, Bandwidth), Display systems, Signals, Processing, Voice communication systems.

Parameter signals were generated representing (1) short-time running-average rate of occurrence of threshold crossings for an input speech signal (Z sub 1) or for the derivative of input speech signal (Z sub 2); and (2) short-time running-average amplitude envelope of the input speech (A). Pairs of these parameter signals were plotted as x- and y-deflections on the display of a storage oscilloscope (the 'vector' display), for speech elements of syllabic length, and the resulting trace patterns ('vectorgrams') were studied. Gross structure of the vectorgram patterns shows a significant tendency to be phoneme-correlated and talker-invariant, is little influenced by accents or by male-female voice distinctions, but is quite sensitive to clarify of enunciation. Fine structure is also seen, some of which is also seen, some of which is also phoneme-correlated and voice-invariant, and which is often repeated with great exactitude when a given speaker repeats a syllable. The relation of these patterns to other work on formant changes is discussed, as is their application to automatic speech recognition and bandwidth compression. Experiments are described in which the A and Z sub 1 or Z sub 2 parameter signals were passed through narrow-band channels and used to reconstruct synthetic speech in a simulated receiver. Questions of instrumentation are discussed, and a technique of system evaluation by direct comparison of input and output vectorgrams is described. Possibilities for improving performance are considered. (Author)

AD-616 654 Div. 8/7, 15/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING, SEQUENTIAL ESTIMATION AND SEQUENTIAL DETECTION PROCESSES,
by Richard Bellman, Robert Kalaba, and David Middleton. 20 Apr 60, 7p Rept. no. P-1973
Unclassified report

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Descriptors: (*Dynamic programming, Communication theory), (*Communication theory, Dynamic programming), Sequential analysis, Signals, Decision theory.

Some general sequential estimation and sequential detection processes are provided with an analytical formulation through use of the functional equation technique of dynamic programming. Some reductions which are useful from the computational viewpoint are indicated, and several applications to radar and communication system theory are sketched. (Author)

AD-616 655 Div. 8/3, 11/2, 12/1

RAND Corp., Santa Monica, Calif.
THE FAR-FIELD BACK-SCATTERING FROM A CONCAVE CORNER OF A BODY OF REVOLUTION,
by Joseph L. Raymond. 21 Apr 60, 20p
Rept. no. P-1976
Unclassified report

Prepared for presentation at the United Kingdom Ministry of Aviation's Symposium on Echoing Properties of Missiles to be held at the Royal Aircraft Establishment in Farnborough, England, 8-9 Jun 60.
Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Radar signals, Scattering), (*Bodies of revolution, Radar echo areas), Rings, Wedges, Conical bodies, Cylindrical bodies, Guided missiles, Aircraft, Diffraction.

The monostatic head-on radar cross section formed by a concave ring singularity has been calculated in the limit of small wave lengths. The solution is based upon Oberhettinger's treatment of the diffraction of plane waves by an infinite wedge. The techniques of solution are chiefly those developed by Siegel when he derived the cross section of a convex ring singularity. The geometry of a concave ring singularity occurs frequently with bodies of revolution when a cylinder is followed by a conical flare or with biconic configurations where a sharp cone is followed by a blunt cone. The theoretical small-wave length treatment is for wedges of all angles. With Siegel's solutions, the cross section of a ring singularity can be predicted for wedges having included angles of from zero to 360 degrees. For geometrically similar concave and convex wedges when the wedge angle is slightly different from a straight line (e.g., 180 degrees), the present concave solution gives a radar echo identical in the first derivative to the convex solution of Siegel, as would be expected from geometric considerations. (Author)

AD-616 660 Div. 8/7, 5/5, 15/1
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MODEL OF ERROR BURST STRUCTURE IN DATA TRANSMISSION,
by Pierre Mertz. 5 May 60, 29p Rept. no. P-1983
Unclassified report

See also AD-272 429, AD-606 658.

Descriptors: (*Data transmission systems, Errors), (*Communication theory, Data transmission systems), Mathematical models, Statistical functions, Probability, Statistical distributions.

An earlier model of error distributions in data transmission circuits assumed errors to come in bursts. The bursts consisted of periods of high error probability, and for simplicity were assumed of equal durations. This is successful for some engineering purposes, but otherwise over-simple. The present proposal assumes a distribution of burst durations that follows recent experimental data. It is bi-modal, and consists of a proportion of 1-bit bursts superimposed on a 'triangular' continuous distribution. Some analysis shows the equivalence of this model with equal duration bursts, when the constant duration is suitably chosen. (Author)

AD-616 665 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A DIGITAL SIMULATION OF AN AIDED ADAPTIVE CHARACTER READING MACHINE,
by Paul Baran and Gerald Estrin. 17 May 60, 25p
Rept. no. P-1989

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Pattern recognition, Reading machines), (*Reading machines, Pattern recognition), Character recognition, Numbers, Distribution, Digital computers, Probability, Simulation.

A pattern recognition system utilizing an initial man-machine learning phase was simulated on an IBM 709 computer. Transformations on a deformed set of 48 samples of each of ten numerals were used to form separation filters, while a second set of 480 similarly varied numerals served as the 'unknown' characters which were examined. Measured probability density distributions of the inked areas of all characters are established, and a weighted stencil or filter is created to distinguish each character relative to the possible set of characters. The numerical experiment demonstrated the extent to which the actual value of the best 'score of match' between the unknown and each character in the set provided confidence in recognition. Whenever the best score is too low, it is possible to call for more complex processes to aid recognition permitting the construction of recognition systems of greater accuracy than the basic reading mechanism. (Author)

AD-616 666 Div. 30/2
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AN AIDED ADAPTIVE CHARACTER READER FOR MACHINE TRANSLATION OF LANGUAGES,
by Paul Baran and Gerald Estrin. 17 May 60, 45p
Rept. no. P-1990

Unclassified report

Prepared in cooperation with California Univ., Los Angeles.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Machine translation, Character recognition), (*Character recognition, Machine translation), (*Pattern recognition, Reading machines), (*Reading machines, Pattern recognition), Language, Digital computers, Input-output devices, Distribution, Probability, Mathematical analysis, Dictionaries.

An elementary procedure for the synthesis of a character recognition device based upon a learning experiment is described. Utilizing information derived from a significant sample of the set of characters to be read and given identification of the samples by a human operator, a computer defines a set of 'filters.' These filters may then be used to transform unknown characters having similar type characteristics. During the recognition process a probability matrix for each character in the alphabet is used to compute a figure of merit for the hypothesis that an unknown character is the same as a known character. It is shown that this elementary model might adequately serve for construction of a fast input device for a language translation machine if it were able to make use of frequency distribution characteristics of the dictionary. A possible implementation with a raw character reading rate of up to 500 characters a second appears feasible. (Author)

AD-616 735 Div. 30/2
CFSTI Prices: HC$4.00 MF$0.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
SABOR I: A FORTRAN PROGRAM FOR THE LINEAR ELASTIC ANALYSIS OF THIN SHELLS OF REVOLUTION UNDER AXISYMMETRIC LOADING BY USING THE MATRIX DISPLACEMENT METHOD,
by John H. Percy, Dhirendra R. Navaratna, and Stanley Klein. Apr 65, 104p
Rept. no. ASRL-TR-121-5
Contract AF04 694 427

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Programming(Computers), Elasticity), (*Structural shells, Elasticity), Bodies of revolution, Loading(Mechanics), Matrix algebra.

A FORTRAN II program for the matrix displacement finite-element method of analysis of thin shells of revolution subjected to axisymmetric loading is presented. Included are descriptions of the idealization and the static analysis of the structure, calculations of the element stiffness matrix, the element mass matrix, and the stress resultants and couples. A complete FORTRAN listing of SABOR I is given together with the program flow diagram and input and output instructions. The complete results for two example problems are listed to enable the user to check the adaptation of the computer program to his facility. (Author)

AD-616 736 Div. 8/2
CFSTI Prices: HC$3.00 MF$0.75

Hughes Aircraft Co., Los Angeles, Calif. Microwave Tube Div.
APPLIED RESEARCH ON EFFICIENCY IMPROVEMENT IN O-TYPE TRAVELING-WAVE TUBES.
Interim engineering rept. no. 3, 15 Jan-15 Apr 65,
by O. Sauseng. Apr 65, 77p
Contract AF33 615 1951, Task 415603

Unclassified report

See also AD-612 115.

Descriptors: (*Traveling-wave tubes, Synchronization(Electronics)), (*Electron beams, Traveling-wave

tubes), Effectiveness, Circuits, Performance(Engineering), Voltage, Gain, Velocity, Electrical impedance.

A single voltage jump taper has been tested in the demountable apparatus. The preliminary results show that substantial efficiency improvements are possible with this method. Electronic efficiencies up to 43%, and depressed efficiencies up to 56% have been observed. At the best over-all efficiency the electronic efficiency is improved by 30% (factor 1.3) and the depressed collector efficiency by 20% (factor 1.2) as compared with the highest efficiencies which could be obtained with the standard circuit alone. The circuit parameters were reevaluated with the electron beam and a significant change of the 'hot circuit' parameters from those of the cold circuit was observed. The 'hot' phase velocities were found to be about 10 to 15% higher, while the 'hot' coupling impedance was about 10 to 20% lower than the cold circuit parameters, practically independent of the frequency. Corrected tube parameters based on the 'hot circuit' parameters are given. The design of velocity step tapers for coupled cavity circuits is outlined in detail. (Author)

AD-616 738 Div. 8/2
CFSTI Prices: HC$3.00 MF$0.50

Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Mountain View, Calif.
X-BAND SOLID-STATE POWER SOURCE.
Quarterly progress rept. no. 3, 1 Dec 64-28 Feb 65, by E. Guthrie, R. Henschke, R. Orrick, and D. Richardson. 28 Feb 65, 51p
Contract DA28 043AMC00120E, Proj. 1P6 22001A056
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.
See also AD-614 047.

Descriptors: (*Radiofrequency generators, X band), (*Frequency multipliers, X band), Transistors, Microwave oscillators, Circuits, Varactor diodes, Silicon, Gallium alloys, Arsenic alloys, Broadband, Narrowband, Radiofrequency power.

A transistor oscillator driver circuit has been constructed that produces 1.25 watts from 1.06 to 1.13 Gc. Another prototype oscillator has been tested and produces 1.0 watt from 1.4 to 1.5 Gc. Test jigs for the corresponding frequency multipliers have been constructed. A couple of silicon varactor diodes have given 40% conversion efficiency in the quadrupler jig going from 1.1 Gc to 4.4 Gc. Also, 60% efficiency was achieved with a gallium arsenide diode in a doubler jig going from 4.4 Gc to 8.8 Gc. The sextupler jig is complete and several diodes are being evaluated. (Author)

AD-616 744 Div. 8/2
CFSTI Prices: HC$3.00 MF$0.75

Radio Corp. of America, Cambridge, Ohio. Communications Systems Div.
MICROMODULE LIFE TEST.
Quarterly progress rept. no. 2, 17 Dec 64-17 Mar 65, by G. E. Cannon.17 Mar 65, 89p
Contract DA36 039AMC01462E
Unclassified report

See also AD-613 605.

Descriptors: (*Microminiaturization(Electronics), Modules(Electronics)), (*Modules(Electronics), Mincrominiaturization(Electronics)), Life expectancy, Resistors, Capacitors, Transistors, Diodes(Semiconductor), Tranformers, Digital systems, Analog systems, Reliability(Electronics), Failure(Mechanics).

Progress is reported on life testing of micromodules. A total of 2703 micromodules remained on life test at the beginning of this quarter and nine failures occurred during the period. The number of failures, accumulated operating time, and lower 60 percent confidence level mean-time-to-failure (MTTF) for life testing to date are given.

AD-616 752 Div. 8/2
CFSTI Prices: HC$2.00 MF$0.50

Bell Telephone Labs., Murray Hill, N. J.
MICROWAVE DIODE RESEARCH.
Quarterly progress rept. no. 11, 10 Dec 64-9 Mar 65, by B. C. DeLoach, R. L. Johnston, and R. C. Swenson. 20 Jun 65, 30p Rept. no. 20
Contract DA36 039sc89205, Proj. 1P6 22001A056
Unclassified report

Continuation of contract DA36 039sc85325.
See also AD-602 780.

Descriptors: (*Diodes(Semiconductor), Microwave equipment), (*Varactor diodes, Microwave equipment), Wave transmission, Tuning devices, Microwave oscillators, Silicon, Radiofrequency power.

Measurement of the loss and reactance for characterizing microwave diodes is described in Chapter 1. Corrections are given for the tuning-stub transmission loss method, in which the basic scheme is to measure the loss introduced when the diode is series-tuned in shunt with a transmission line. The tuning stub has to be calibrated for both loss and reactance since the former is not a constant as has sometimes been assumed. The method has been used primarily at 1 Gc. In Chapter 2 are described preliminary measurements on an exploratory oscillator. Although not part of the contract, this work is reported because it is related to the contract objectives. Continuous-wave oscillations have been obtained from a reverse-biased silicon diode. An output of approximately 3 mw at 8.9 Gc was obtained at 0.1 per cent efficiency. The oscillator also sometimes gave self-pumped parametric oscillations, which at first were inexplicable but now have been identified. (Author)

AD-616 754 Div. 8/2, 8/6
CFSTI Prices: HC$4.00 MF$0.75

Sperry Microwave Electronics Co., Clearwater, Fla.
MICROWAVE FERROELECTRIC PHASE SHIFTERS AND SWITCHES.
Final rept. for 15 Jun 63-15 Mar 65.
Mar 65, 112p Rept. no. SJ-230-0046-5
Contract DA36 039AMC02340E, Proj. 1P622001A057
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Phase shifters, Microwave frequency), (*Electronic switches, Microwave frequency), (*Ferroelectric materials, Phase shifters), Ultrahigh frequency, S-band, L-band, Transmission lines, Phase shift, Programming(Computers), Lead compounds, Strontium compounds, Titanium compounds, Oxides.

Final data are given for UHF, L, and S band ferroelectric phase shifters and switches. The best ferroelectric material developed was (Pb0.315 Sr 0.685 Ti03).

This material used in stripline structures resulted in UHF and L band phase shifters nominally with 0 to 200 degree relative phase shift and 1 to 3 db insertion loss over a 10% band. S band devices exhibit 0 to 200 degree relative phase shift with 1 to 5 db insertion loss. The same material used in multistub ferroelectric switches resulted in an L band three-stub switch with 40 db isolation and less than 1 db insertion loss over a 10% bandwidth. Two-and three-stub UHF band devices are believed to be capable of yielding similar results. S band devices are believed to be capable of giving 30 db isolation with less than 1 db insertion loss over a 10% bandwidth. New ferroelectric materials with loss factors less than 0.04 and change in capacitance delta C/C > 0.75 will lead to phase shifters and switches with significantly improved properties. Details and results of a computer analysis of the multistub switch are given. (Author)

AD-616 755 Div. 30/2, 25/6
CFSTI Prices: HC$3.00 MF$0.75

Laboratory for Electronics, Inc., Boston, Mass.
ELECTRO-OPTICAL MATRIX DISPLAY.
Final engineering rept. for 1 May 64-29 Apr 65.
Jun 65, 57p Rept. no. 480-A1
Contract NObsr91199
Unclassifted report

See also AD-613 721.

Descriptors: (*Thin films(Storage devices), Display systems), (*Magneto-optics effect, Thin films(Storage devices)), (*Computer storage devices, Thin films (Storage devices)), Command and control systems, Ferromagnetic materials, Powder metals, Photosensitivity, Nickel, Iron, Colloids, Films, Epoxy plastics, Encapsulation, Bonding.

Phases I and II of the program were completed. Information was obtained concerning the dependence of the dense-banded domain structure on parameters of film preparation in order to be able to produce good display elements with reduced coercive force. The best results were obtained using melt compositions of 83-17 NiFe, high evaporation rates and high substrate temperature. A substantial development effort in preparation of display colloid resulted in a good understanding of the nature of the several processes that can be used. The required control in colloid preparation is possible with a process based upon forming first a seed solution of particles of small and very uniform size, then controlledly enlarging the seed particles, and finally adding the magnetic property. Techniques of panel module assembly were studied, including edge encapsulation, inner bonding and silk screening. Experimental cells were made that show no sign of seal deficiency after five months. Several techniques of addressing display elements were verified. These include pulsed coincident currents, and coincidence of a.c. and pulsed currents for both spot and line-at-a-time writing. A demonstration model was constructed which makes it possible to command a 16 x 16 matrix of display spots on a line-at-a-time basis.

AD-616 772 Div. 8/2
CFSTI Prices: HC$3.00 MF$0.75

Army Electronics Command, Fort Monmouth, N. J.
MICROWAVE AMPLIFIER PERFORMANCE OF GERMANIUM TRANSISTORS.
Technical rept.,
by G. E. Hambleton and V. Gelnovatch. Apr 65,
68p ECOM-2579
Proj. 1P6 22001A056, Task 1P6 22001A05604
Unclassified report

Descriptors: (*Transistors, Microwave amplifiers), (*Transistor amplifiers, Microwave equipment), L-band, Gain, Noise(Radio), Statistical analysis, Radiofrequency power, Ultrahigh frequency, Performance(Engineering), Admittance, Measurement, Germanium.

The report describes an investigation of available microwave transistors in a standard, single-stage amplifier configuration at L-band. The program consisted of the measurement of a total of 70 transistors from Bell Telephone Laboratories and Texas Instruments for noise and power gain properties at two frequencies near 1.0 Gc. The measurement conditions consisted of two emitter current levels, 2 and 5 milliampers, and combinations of impedance matching on the input and output ports. Standard coaxial r-f components were used, with isolators at the input and output ports of the amplifier to establish an exact 50 ohm reference. Y-parameters were also measured on the BTL transistors. The y-parameters were used to calculate quality factors such as unilateral gain, maximum stable gain, and maximum available gain. Noise figure was calculated for an average of the y-parameters as a function of frequency and source resistance. The measured gains and noise figures were compared to calculated values and correlation data is presented. Statistical analysis results are presented on distribution of calculated and measured gains and noise figures. For application as an r-f preamplifier, the units were evaluated in terms of noise measure, which combines gain and noise characteristics. Noise measure is displayed for all d-c and r-f measurement conditions. (Author)

AD-616 781 Div. 8/2
CFSTI Prices: HC$2.00 MF$0.50

Texas Instruments, Inc., Dallas.
LOW NOISE L-BAND TRANSISTOR.
Quarterly progress rept. no. 3, 15 Nov 64-15 Feb 65,
by Doyle S. Granberry. 15 Mar 65, 26p
Rept. no. 03-65-28
Contract DA28 043AMC00119E, Proj. 1P6 22001A056
Unclassified report

Descriptors: (*Transistors L-band), Noise(Radio), Transistor amplifiers, Microwave equipment, Resistance(Electrical), Gain, Germanium, Epitaxial growth, Design, Packaging, Vapor plating, Impurities.

Progress is reported toward reaching the 3 db noise figure objective at a frequency of 1.3 Gc. Cut-off frequency and base resistance are now very close to the values required to meet the objectives. Technology has improved in areas of device geometry, evaporating impurity materials, and other doping techniques. Although serious questions had been raised about the adequacy of base contacts, these base contacts were studied and found adequate. Measuring techniques using the common emitter connection now indicate that noise figures at 1.3 Gc may be much better than earlier tests showed them to be. Measured in this way, a few of the devices submitted during the quarter probably would have been very close to 3 db at 1.3 Gc. Further improvements are anticipated. (Author)

AD-616 783 Div. 8/3, 32/3
CFSTI Prices: HC$3.00 MF$0.75

Electronic Properties Information Center, Culver City, Calif.
GLOSSARY OF ELECTRONIC PROPERTIES,
by Emil Schafer. Jan 65, 90p Rept. no. S-7
Contracts AF33 615 1235, AF33 615 2460,
Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Electronics, Documentation),

Electrical properties, Semiconductors, Metals, Indexes.

A glossary of all electronic property indexing terms used by the Electronic Properties Information Center was prepared. In addition, definitions are given for those terms subsumed under the main property entry term. A detailed list of cross-references and subsumed terms provides a complete index to the glossary and to the property term under which data has been indexed by the Center. (Author)

AD-616 802 Div. 30/2, 15/1

Bell Telephone Labs., Inc., Murray Hill, N. J.
COMPUTER STUDIES OF TURING MACHINE PROBLEMS.
Rev. ed.,
by Shen Lin and Tibor Rado. Aug 64, 17p
Grant DA ARO D31 124G312
AROD 1685:19

Unclassified report

Revision of manuscript submitted Mar 63
Pub. in Journal of the Association for Computing Machinery v12 n2 p196-212 Apr 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Programming(Computers), Computers), (*Functions, Programming(Computers)), (*Game theory, Mathematical logic), Numbers.

This paper solves a problem relating to Turing machines arising in connection with the Busy Beaver logical game (T. Rodo. On non-computable functions. Bell. Sys. Tech. J. 41, 3 (May 1962)). Specifically, with the help of a computer program, the values of two very well-defined positive integers Summation (3) and SH(3) are determined to be 6 and 21 respectively. The functions Summation (n) and SH(n), however, are noncomputable functions. (Author)

AD-616 817 Div. 8/2

Mitre Corp., Bedford, Mass.
'UNIVER'-A FAST, VERSATILE MULTILOGIC DIGITAL AMPLIFIER FOR MICROLOGIC CIRCUITS,
by Y. Cho. and N. Zimbel. 19 Aug 64, 9p
Contract AF19 628 2390
ESD TDR-64-136

Unclassified report

Pub. in Proceedings of the IEEE v52 n12 p1591-8 Dec 1964.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Amplifier's, Computer logic), (*Computer logic, Amplifiers), (*Integrated circuits, Computer logic), Tunnel diodes, Digital systems, Modules(Electronic), Switching circuits.

The nature of integrated circuit fabrication limits the number of circuit modules in a system due to the high developmental cost involved. This paper described a unique approach to designing an ultra-high speed multiple-function logic amplifier in integrated circuit form. Using the scheme of a pair of tunnel-diode coupled emitter followers driven by an emitter-coupled amplifier, it is shown that the circuit, designated UNIVER, has a capability of both storage (flipflop) and wave-shaping functions, and can drive low impedance (35 ohms) transmission lines with a high (8) logic gain under 1 nsec total stage delay, while suppressing the oscillatory ringing commonly occurring in an emitter follower. A large number of the UNIVER circuits were built in integrated circuit form and then evaluated as multiple functional modules in a 100-Mc digital system. The logical performance and switching characteristics of the circuits were ascertained. Test results collected over a twelve-month period are discussed as well as the extended applications of the UNIVER circuit scheme. (Author)

AD-616 838 Div. 8/4, 26/1

Air Force Avionics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
FULL-PLANE THRESHOLD ENERGIES FOR CATHODE SPUTTERING OF METALS WITH Ar(+) IONS,
by Erich B. Henschke and Samuel E. Derby.
26 Dec 62, 12p AL TR-64-300
Proj. 4152

Unclassified report

Pub. in Journal of Applied Physics v34 n8 p2458-67 Aug 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Argon, Sputtering), (*Sputtering, Argon), Plasma medium, Ions, Electrodes, Films, Contamination, Ion bombardment, Cathodes.

Full-plane threshold energies at normal ion incidence of Ar(+) ions were determined for sixteen metals with a method of 'detection of deposits,' using demountable sputtering tubes of different designs. Since in each case the target, immersed like a Langmuir probe in a high-density plasma, was bombarded by singly charged ions with a high ion current density under background conditions similar to those in Hg(+)-ion sputtering tubes used for the determination of thresholds, the threshold data obtained for Ar(+)-ion bombardment are comparable to those formerly published for sputtering with Hg(+) ions. This comparison discloses that threshold predictions for Ar(+) ions, formerly made by simply exchanging the mass of the Ar(+) ion for the mass of the Hg(+) ion in a threshold formula, are not correct at all. This result also implies that threshold formulas in which the interaction between the target atom and the impinging ion is only expressed by a mass factor containing the masses of the target atom and of the ion are not adequate to cover simultaneously the thresholds for different kinds of ions. Debye waves during sputtering is different for different bombarding ions. The thresholds for Ar(+) -ion sputtering are, in general, lower than those for Hg(+)-ion bombardment; however, they obey the same law of periodicity seen in a plot vs atomic number, as formerly established by the author for sputtering with Hg(+) ions. (Author)

AD-616 851 Div. 30/2
CFSTI Prices: HC$6.00 MF$1.50

Sylvania Electronic Systems, Waltham, Mass.
MOBIDIC B FINAL DESIGN PLAN, VOLUME II.
1964, 280p Rept. no. Z53-2N

Unclassified report

Descriptors: (*Digital computers, Mobile), Design, Circuits, Computer logic, Relaxation oscillators, Packaging, Trailers, Power supplies, Reliability-(Electronics), Maintenance, Specifications.

The circuits, packaging, trailer layout and installation, power supply system, reliability, testing, maintenance, and mechanization of the MOBIDIC system are given.

AD-616 853 Div. 30/2
CFSTI Prices: HC$7.00 MF$1.50

Sylvania Electronic Systems, Needham, Mass.

MOBIDIC B INSTRUCTION MANUAL, VOLUME I, CHAPTERS 1-3.
1 Mar 62, 301p Rept. no. IB53-1N
Contract DA36 039sc78050, Proj. 3 58 02 401
Unclassified report

Descriptors: (*Digital computers, Mobile), (*Instruction manuals, Digital computers), Computer logic, Transistors, Gates(Circuits), Binary arithmetic, Algebras, Design, Data processing systems.

Information necessary to install, adjust, operate, and maintain the MOBIDIC B computer and to understand the theory of operation of MOBIDIC data processing systems is provided in this instruction manual. The symbolism used, including Boolean algebra, transistor logic, and binary arithmetic, is discussed. The system organization of MOBIDIC B is discussed.

AD-616 854 Div. 30/2
CFSTI Prices: HC$2.00 MF$1.75

Sylvania Electronic Systems, Needham, Mass.
MOBILE DIGITAL COMPUTER PROGRAM. MOBIDIC B, FINAL DESIGN PLAN, VOLUME I.
16 Oct 59, 324p Rept. no. Z53-2N
Contract DA36 039SC78050, Proj. 3 58 02 401
Unclassified report

Descriptors: (*Digital computers, Mobile), Design, Systems engineering, Data processing systems.

System organization, system characteristics, and detailed design of the MOBIDIC are given.

AD-616 884 Div. 8/7
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Los Angeles. Western Management Science Inst.
DISCRETE SIGNALING AND CODING SYSTEMS.
Working paper,
by Leo Breiman. Apr 65, 38p Rept. no. WP-74
Contract Nonr23375, Proj. NR047 041
Unclassified report

Descriptors: (*Communication theory, Analysis), Probability, Mathematical models, Coding, Recording systems, Communication systems.

An elementary exposition of the author's view of Shannon's information theory. This includes the ideas of block coding, the noiseless coding theorem, channels, accurate transmission over noisy channels, transmission rates, and the noisy coding theorem. (Author)

AD-616 911 Div. 8/1
CFSTI Prices: HC$3.00 MF$0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
OPTIMIZATION OF THE YAGI ARRAY, II.
Interim scientific rept.,
by I. Larry Morris. 16 Feb 65, 72p
Rept. no. SR-10, series 3
Contract AF19 628 2406; Grant NSF GP851,
Proj. 5635, Task 563502
AFCRL 65-346 Unclassified report

See also AD-615 742.

Descriptors: (*Yagi antennas, Optimization), (*Optimization, Yagi antennas), Gain, Electrical impedance, Programming computers, Programming languages, Antenna radiation patterns.

The computer programs for optimizing the Yagi array, which were written in FORTRAN for the IBM 7094 computer, are discussed in detail. These programs employ the modified quasi-zero-order theory as well as certain techniques which reduce the execution time and facilitate the reduction of data. Typical printout from the four options of the main program is also included. Detailed investigations of the 1- and 4-director Yagi arrays (with directors of constant length, radius, and spacing) are summarized in the form of contour maps for forward gain, backward gain, front-to-back ratio, input resistance, and input reactance. Horizontal field patterns and vector diagrams are presented for 1-, 2-, and 4-director arrays having maxima in forward gain or front-to-back ratio. The method used to search for these maxima is outlined. With the director length fixed at 0.43 lambda, a comparison is made between the 1-, 2-, 4-, and 8-director Yagi arrays. (Author)

AD-616 912 Div. 8/1
CFSTI Prices: HC$3.00 MF$0.75

Cruft Lab., Harvard Univ., Cambridge, Mass.
ANTENNA WITH AN ANISOTROPIC FERRITE SHEATH INSIDE A PARALLEL-PLATE WAVEGUIDE. THEORETICAL AND EXPERIMENTAL STUDIES.
Interim scientific rept.,
by B. Ramo Rao. 1 Mar 65, 78p
Rept. no. SR-9, series 3
Contract AF19 628 2406; Grant NSF GP851,
Proj. 5635, Task 563502
AFCRL 65-336
Unclassified report

Descriptors: (*Antenna configurations, Wave transmission), (*Antennas, Electromagnetic properties), (*Ferromagnetic materials, Antennas), Waveguides, Magnetic resonance, Admittance, Magnesium compounds, Manganese compounds, Aluminum compounds, Magnetic fields, Electrical impedance, Electric currents, Boundary value problems.

Closed form expressions for the current distribution and impedance of an antenna with a magnetized ferrite sheath inside a parallel-plate wave-guide have been obtained by a modal expansion technique. Numerical results have been obtained with an IBM 7090 computer for applied dc magnetic fields below resonance. Particular emphasis has been paid to studying the following aspects of the problem: (1) the effect of the birefringent properties of the magnetized ferrite sheath on the current and charge distribution of the antenna, (2) the behavior of the antenna at waveguide mode cutoff and at ferromagnetic resonance, (3) the effect of the feed-point singularity on antenna characteristics. In order to verify some of the theoretical predictions, experiments have been made at 1000 megacycles with an Indiana General R-6 Mg-Mn-Al ferrite sample. The experimental results agree qualitatively with theory. A description of the apparatus is included in this report. (Author)

AD-616 917 Div. 30/2
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Palo Alto, Calif. Research Labs.
DIFEQ INTEGRATION ROUTINE-USER'S MANUAL.
Technical rept.,
by R. E. Moore, J. A. Davison, H. R. Jaschke, and S. Shayer. 18 Feb 64, 45p Unclassified report
Rept. no. LMSC-6-90-64-6

Descriptors: (*Programming(Computers), Differential equations), (*Differential equations, Programming(Computers)), Integration, Series, Compilers.

The purpose of the paper is to describe the use of a novel program, DIFEQ, written for the IBM 7094 computer, for 'solving' systems of ordinary differential equations, that is to say, for finding numerical values of particular solutions with assigned initial conditions.

AD-616 959 Div. 8/2

Air Force Cambridge Research Labs., Bedford, Mass.
AN OPERATIONAL AMPLIFIER CIRCUIT FOR CHARACTERIZATION OF NEGATIVE-CONDUCTANCE DEVICES.
Instrumentation papers,
by Virgil E. Vickers. 19 Oct 64, 6p
Rept. no. IP-59, AFCRL 65-281
Proj. 5621, Task 562103

Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings v53 n2 p185 Feb 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Negative resistance circuits, Electric bridges), (*Amplifiers, Negative resistance circuits), Measuring devices(Electrical + Electronic), Electrical engineering.

AD-616 986 Div. 8/1
CFSTI Prices: HC$1.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
COMMUTATING FEED FOR CIRCULAR ARRAY ANTENNA AND ITS APPLICATION TO THE LES.
Technical note,
by J. B. Rankin. 24 May 65, 18p
Rept. no. TN-1965-19
Contract AF19 628 500
ESD TDR-65-225

Unclassified report

Descriptors: (*Antenna feeds, Phased arrays), (*Commutators, Antenna feeds), (*Satellite antennas, Antenna feeds), (*Phased arrays, Cylindrical bodies), Electronic switches, Powder dividers, Phase-(Electronics), Waveguide slots, Diodes, Polarization, Impedance matching, Lunar probles.

A commutator for circular antenna array is described using multi-throw switches fed in parallel through a power divider. The excitation phases of the elements can be controlled by phasing elements located between the power divider and the switches. In applications requiring excitation of only a few radiators at a time, each phasing element might simply be a diode together with tuning reactances. Application of the commutator and phasing scheme to a step-scanned antenna for LES-5 or 6 is described. (Author)

AD-616 995 Div. 8/2
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
DESIGN TECHNIQUE OF UHF STRIP-LINE FILTERS,
by Joseph A. Mosko. Apr 65, 27p
Rept. no. NOTS-TP-3731
Task TA RM3781 001 216 1WW115 00 001
NAVWEPS 8677

Unclassified report

Descriptors: (*Band-pass filters, Ultrahigh frequency), (*Transmission lines, Band-pass filters), Design, Standing wave ratios, Resonators, Performance-(Engineering), Coupling circuits, Electrical impedance.

The report describes a new technique in UHF strip-transmission-line filter design. The filter consists mainly of parallel-coupled half-wavelength resonators. The design differs from the usual parallel-coupled resonator configuration in that the usual end-coupled resonators have been replaced by their approximate equivalent circuit. The important advantages realized in the design of this type of paralled-coupled resonator filter are higher power rating, and coupling gaps that are less critical because they are much larger. Several of these experimental strip-line filters were constructed to verify configuration usability. Data obtained proved the excellent performance of this type of modified filter. (Author)

AD-617 003 Div. 8/2, 5/2
CFSTI Prices: HC$4.00 MF$1.00

Microwave Associates, Inc., Burlington, Mass.
X-BAND SOLID-STATE DETECTOR/AMPLIFIER.
Final progress rept. for 1 Jul 63-15 Mar 65,
by J. J. Brule. 15 Mar 65, 141p
Contract DA36 039AMC03274E, Proj. 1P6 22001A056

Unclassified report

Descriptors: (*Microwave amplifiers, X band), (*Radio receivers, X band), (*Transistors, Radio receivers), Portable, Circuits, Noise(Radio), Intermediate frequency, Preamplifiers, Mixers-(Electronic), Limiters, Oscillators, Tunnel diodes, Transistor amplifiers.

Components and techniques for application in small lightweight X-Band detector-amplifier circuits were reviewed and evaluated. Specific areas of investigation included: backward diode mixers; 'starved mixer operation'; low noise transistorized I.F. preamplifiers; an I.F. parametric amplifier; tunnel-diode local oscillators; a tunnel-diode self-oscillating mixer; and low noise R.F. pre-amplifiers. High power diode limiters which require no control voltages were developed in waveguide and strip transmission line. Integrated mixer/I.F. pre-amplifier assemblies with an overall noise figure of 8.0 db were realized. A compact solid-state local oscillator using a 'snap-off' diode as a high order multiplier and providing an output power of 10 mwatts was developed. Also, a tunnel-diode self-oscillating mixer with integral I.F. pre-amplifier assembly was designed. Engineering test models of three solid-state detector-amplifier circuits were fabricated and tested. Overall noise figures ranging from 11.0 db to 8.0 db were obtained. The physical and performance characteristics of several detector-amplifier circuits were evaluated and compared; and relationships between noise figure and weight and noise figure and cost were derived. (Author)

AD-617 006 Div. 8/2, 26/1, 26/4
CFSTI Prices: HC$4.00 MF$0.75

CTS Knights, Inc., Sandwich, Ill.
CRYSTAL UNITS TYPE CR-(XM-11) /U, 1 TO 20 MC IN THE TYPE HC-27/U GLASS HOLDERS.
Completion rept., step 1,
by Roger E. Bennett. Mar 65, 105p
Contract DA36 039SC81274

Unclassified report

Descriptors: (*Crystals, Semiconductor devices), (*Crystal holders, Manufacturing methods), High frequency, Crystals, Quartz, Aging(Materials), Glass, Bonding, Sealing compounds, Induction heating, Vacuum seals, Manufacturing methods, Processing, Quality control.

Designs and production processes, together with yields, are given for the XM-11/U (CR-18/U in glass). Aging data is also given. The frequencies covered are 4.3, 9, 15.5, and 20 mc. Data is also given on experimental designs for a 1 mc unit. An induction sealing machine is described. (Author)

AD-617 028 Div. 8/2

Army Electronics Labs., Fort Monmouth, N. J.
'SOLDER BALL' FORMATION IN SILICON ALLOY TRANSISTORS,
by E. B. Hakim, L. K. McSherry, and B. Reich.
18 Dec 64, 1p
Unclassified report

Pub. in Proceedings of the IEEE v53 n4 p389 Apr 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Transistors, Soldered joints), (*Soldered joints, Transistors), Silicon alloys, Tin, Melting, Transition temperature, Circuits, Malfunctions, Semiconductor devices.

It was found that formation of 'solder balls' may not be due to any foreign matter in the package but instead be a characteristic of this type of device when (1) Local hot spots develop as the result of secondary breakdown or (2) temperatures rise in excess of 230 C, or (3) during life testing or 'burn-in.'

AD-617 058 Div. 8/7, 32/3, 30/2
CFSTI Prices: HC$3.00 MF$0.75

George Washington Univ., Washington, D. C.
PERFORMANCE IN SINGLE-STAGE VS MULTI-STAGE CODING AS A FUNCTION OF INFORMATION STRUCTURE.
Master's thesis,
by Duncan Lee Dieterly. Jun 65, 57p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Data processing systems, Communication theory), (*Communication theory, Data processing system), (*Programming(Computers), Communication theory), (*Coding, Communication theory), Language, Information retrieval, Applied psychology, Data transmission systems, Probability.

Miller in studying language learning has found that a subject can only absorb so much of a presented stimulus inventory, or string of digits. He has summarized the research of this type and determined that the channel capacity of the individual exists at the level of seven bits approximately. In order to increase the span of information that can be handled he has developed the concept of chunking, which is a method of reducing information to groups of easily handled chunks. These chunks can then be coded by some method so that recall of the coded symbol will result in recall of the information chunked into the group. In this context a multi-stage code, which is a series of binary digits, becomes a method for chunking information. The hypothesis of the report is: A given amount of information can be received and transmitted more rapidly when the information is presented in a multi-stage inventory.

AD-617 110 Div. 8/2
CFSTI Prices: HC$1.00 MF$0.50

Bliley Electric Co., Erie, Pa.

MINIATURE CRYSTAL UNITS FOR SINGLE-SIDEBAND OPERATIONS.
Quarterly rept. no. 3, 1 Dec 64-28 Feb 65,
by J. M. Wolfskill, Roy Spurlin, and Robert Mouck.
28 Feb 65, 21p
Contract DA28 043AMC00148E, Proj. 1G622001A5801
Unclassified report

Descriptors: (*Crystals, Miniature electronic equipment), (*Miniature electronic equipment, Single sideband communication systems), Crystal holders, Glass, Quartz, High frequency, Quartz resonators, Seals-(Stoppers), Portable.

Progress is reported on the development and fabrication of special crystal units designed especially for use in portable single-sideband communications equipment. The crystals, in the 5- to 20-megacycle range, are mounted in miniature HC-26 glass holders. Operated at 10-microwatts drive, these crystals must attain 200,000 Q and have matched temperature characteristics. Fabrication and testing of the first developmental model samples were undertaken. Serious problems were encountered in producing these units; losses in sealing were much more severe than had been expected. Most of the losses were because of distortion of temperature characteristics as a result of sealing. These distortions resulted from twinning of small portions of the quartz resonators--a condition which was often not accompanied by significant changes in resistance values. Although not completed during the period covered by this report, changes in sealing fixtures and techniques promise to minimize this problem on future groups. (Author)

AD-617 119 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
SMALL SCALE COMPUTER 'PROMIN',
by V. I. Karpus and Yu. I. Kodzaev. 1965, 9p
FTD-TT-65-453
TT 65-62527
Unclassified report

Unedited rough draft trans. of Mashinostroenie (USSR) n4(28) p54-7 1964.

Descriptors: (*Digital computers, Operation), Automation, Programming(Computers), USSR.

The computer 'PROMIN' is discussed. It belongs to the type of small universal digital computers, intended for automation of engineering and scientific calculations and for average complexity calculations in various construction bureaus, scientific research institutions and planning organizations. On the PROMIN' computer can be carried out the following basic operations: addition, subtraction, multiplication and division, calculation of square root, addition and subtraction with fixed comma, calculation of basic and reverse trigonometric functions, calculation of hyperbolic functions, calculation of logarithmic and exponential of functions, calculation of scalar derivative of vectors (not higher than 30th order), solving systems of algebraic equations (not higher than 7th order), solving systems of ordinary differential equations, finding values of definite integral, and solving transcendental and non-linear algebraic equations.

AD-617 123 Div. 8/1
CFSTI Prices: HC$6.00 MF$1.25

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.

OUT OF BAND PERFORMANCE OF ANTENNAS,
by W. R. Lind. May 65, 204p
Rept. no. 65-18
Contract AF30 602 3290, Proj. 4540, Task 454002
RADC TR-65-43
Unclassified report

Descriptors: (*Antennas, Performance(Engineering)), Antenna radiation patterns, Gain, Electrical impedance, Biconical antennas, Horn antennas, Parabolic antennas.

The out of band performance of antennas is considered. The types covered are cylindrical, biconical, horn and parabolic antennas. Both measured and theoretical data are presented. The antenna parameters covered are radiation and input impedances, gain, and radiation patterns. (Author)

AD-617 124 Div. 8/1, 8/6
CFSTI Prices: HC$2.00 MF$0.50

Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
RECIPROCAL WAVEGUIDE DEVICES FOR ELECTRONIC POLARIZATION CONTROL,
by W. J. Wesner. 31 May 65, 48p
Rept. no. 1804-4
Contract NOw64 0293d Unclassified report

Descriptors: (*Waveguides, Polarization), (*Polarization, Waveguides), (*Phase shifters, Waveguides), (*Electromagnetic waves, Polarization), Microwave frequency, Microwave equipment, Ferrites, Wave transmission, Remote control systems.

A reciprocal waveguide device is proposed to control electronically the polarization angle of a linearly polarized electromagnetic wave at microwave frequencies. Two approaches are discussed and experimental measurements are included to demonstrate successful operation. Reciprocal electronic phase shifters, required for each approach, are surveyed and a ferrite type is discussed in detail. (Author)

AD-617 127 Div. 8/7

IIT Research Inst., Chicago, Ill.
CHANNELS WHICH TRANSMIT LETTERS OF UNEQUAL DURATION.
Final rept. for Jan-Oct 61,
by Ralph M. Krause. 25 Sep 61, 15p
Contract AF33 616 8240, Proj. 7233, Task 723305
AMRL TR-65-92
Unclassified report

Pub. in Information and Control v5 n1 p13-24 Mar 1962
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Communication theory, Coding), (*Coding, Communication theory), Communication systems, Bionics, Mathematical models.

An inequality of McMillan (1956) implied by unique decipherability is generalized to channels whose letters have unequal costs and used to prove that no uniquely decipherable encoding can increase the capacity of such a channel. The same methods yield a proof of the equivalence of several definitions of capacity. The matching problem is considered, a code construction of Shannon (1948) is generalized as a partial answer, and some unsolved problems are described. Finally, some generalizations are given for channels capable of transmitting a denumerable infinity of distinct letters. (Author)

AD-617 128 Div. 8/2
CFSTI Prices: HC$3.00 MF$0.75

Airborne Instruments Lab., Deer Park, N. Y.
CRYOGENIC RADIO-FREQUENCY TUNER.
Final rept. for 1 Jul 63-31 Dec 64,
by F. R. Arams, K. Siegel, J. Fradkin, and E. W. Sard. 31 Dec 64, 61p
Rept. no. 3496-1
Contract DA36 039AMC03321E,
Proj. 1P6 20501A448 02 15
ECOM 03321-F. Unclassified report

Descriptors: (*Tuning devices, Superconductivity), (*Cryogenics, Tuning devices), High frequency, Design, Bandwidth, Circuits, Superconductors, Capacitors, Electronic switches, Packaging, Stability.

A superconducting RF tuner was successfully developed, and a packaged model suitable for experimental use was demonstrated. This unit has (1) a 3.3-to-1 tuning range of 6.3 to 21 Mc, (2) unloaded Q's ranging from 350,000 to 600,000 over the tuning band, (3) bandwidths adjustable from less than 400 cps to greater than 16 kc, (4) calibrated external controls for main-frequency tuning, fine-frequency tuning and bandwidth, and (5) good resettability. An optimum circuit design was developed to obtain minimum variation with frequency consistent with minimizing resonant-frequency variation with bandwidth changes. Split-stator tuning capacitors were used to eliminate superconducting contact problems. The report describes the design considerations and initial superconducting circuit experiments, which yielded unloaded Q's as high as 2.2 million near 20 Mc at 4.2K, and the packaged cryogenic RF tuner itself (including test data). (Author)

AD-617 140 Div. 8/1
CFSTI Prices: HC$2.00 MF$0.50

Sylvania Electronic Systems, Williamsville, N. Y.
ELECTRONICALLY STEERABLE ARRAY - CHANGE A.
Quarterly technical rept. no. 1, 30 Nov 64-26 Feb 65,
by T. R. Schiller and W. S. Heath. May 65, 31p
Contract AF30 602 3041, Proj. 4506, Task 450604
RADC TR-65-90
See also AD-607 439. Unclassified report

Descriptors: (*Antennas, Microwave frequency), (*Millimeter waves, Antennas), (*Ferromagnetic materials, Electronic scanners), Spacecraft, Scanning, Scattering, Antenna configurations, Gain, Reflectors, Antenna radiation patterns, Electromagnets, Electronic scanners, Electromagnetic lenses.

The report describes the effort expended during the first quarter of the Engineering Change 'A' portion of the Electronically Steerable Array Program to design and build a high gain, electronically steerable, millimeter antenna system. Design goals for the breadboard model antenna system were formulated during this period, preparations were made for evaluating cubic and hexagonal ferrites for scanning tests and a detailed analysis was made of a proposed hybrid antenna system employing ferrites and a scattering mechanism. The results of this analysis, however, indicate that the hybrid system selected for analysis will not meet all the performance goals of the system so that future design work will be concentrated on ferrite scanner techniques. (Author)

AD-617 141 Div. 8/2
CFSTI Prices: HC$4.00 MF$0.75

General Electric Co., Philadelphia. Missile and Space Div.

ACCELERATED TESTING OF HIGH RELIABILITY PARTS.
Interim technical rept. no. 2, 10 Oct 64-10 Feb 65,
by T. M. Walsh, H. S. Endicott, G. Best, G. Bretts, and H. McLean. May 65, 104p
Contract AF30 602 3415, Proj. 5519, Task 551906
RADC TR-65-64

Unclassified report

See also AD-610 943.

Descriptors: (*Resistors, Test methods), (*Glass capacitors, Test methods), (*Diodes(Semiconductor), Test methods), (*Transistors, Test methods), (*Test methods, Electronic equipment), Aging(Materials), Reliability(Electronics), Degradation, Failure(Mechanics), Films, Oxides, Silicon, Semiconductors, Stresses, Mathematical models, Life expectancy.

As a result of reliability testing of glass dielectric capacitors, data has been accumulated which offers an indication of an upper temperature limit for thermal acceleration of failures. The data which is still being gathered shows that an analytical expression for insulation resistance is extremely important in formalizing the stress response of the dielectric. Preliminary analysis of high stress data indicates that the oxide film resistor, the R-2008 P5 diode and the transistors have shown significant trends or failures; however, additional work is being performed in these areas to confirm the failure mechanisms. (Author)

AD-617 144 Div. 8/2
CFSTI Prices: HC$5.00 MF$1.25

ITT Federal Labs., Nutley, N. J.
METHODS AND TECHNIQUES STUDY REPORT, THREE-OSCILLATOR COMBINER.
Jun 65, 190p Rept. no. TD65-202
Contract NObsr93087, Proj. SS294001, Task 9215

Unclassified report

Descriptors: (*Oscillators, Time signals), (*Time signals, Oscillators), Reliability(Electronics), Synchronization(Electronics), Standards, Frequency, Shipborne, Digital systems, Phase shifters, Mixers-(Electronic), Atomic clocks, Control systems, Microminiaturization(Electronics), Scources, Phase shift, Phase-locked systems.

The function of an oscillator combiner is to provide a frequency source of great reliability. The reliability is high because from a combiner several outputs can be obtained without interruption, even if one or more of the inputs fail. Another important requirement performed by a combiner is continuous monitoring of the frequency drift of each input signal with respect to the other inputs. Using this information a faulty input can be automatically prevented from making any contribution to the output signals. While performing these useful functions the combiner must be designed in such a manner so as not to degrade the qualities of its input signals. Specifically this means that it should not cause a change in the phase of its outputs without a similar change occurring in the inputs. For present requirements it must maintain this one to one correlation with a degradation of less than one microsecond. It is quite conceivable however that by 1970 this requirement may be an order of magnitude greater. For this reason a combiner chosen to meet the present requirements should not have an inherent phase shift limitation, its phase degradation should only be a function of component qualities. Combiners capable of providing these functions and meeting the specific requirements of SHIPS-0-4677 were studied. The advantages and disadvantages of each are listed. (Author)

AD-617 158 Div. 30/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
ABOUT A METHOD OF CHECKING AND CORRECTING COMPUTERS, REPRODUCING GIVEN FUNCTIONS,
by M. B. Ignatev and V. V. Mikhailov. 24 May 65, 12p FTD-TT-65-83
TT 65-62542

Unclassified report

Unedited rough draft trans. of Sbornik Rabot po Voprosam Elektromekhaniki (USSR) n9 p38-45 1963.

Descriptors: (*Computers, Reliability), (*Functions, Corrections), Errors, Programming(Computers), Stability, Differential equations, USSR.

A method is proposed for checking and correcting computers.

AD-617 164 Div. 8/2
CFSTI Prices: HC$3.00 MF$0.75

Pioneer-Central Div., Bendix Corp., Davenport, Iowa.
FREQUENCY TEMPERATURE COMPENSATION TECHNIQUES FOR QUARTZ CRYSTAL OSCILLATORS.
Interim rept. no. 6, 1 Jul 63-31 Dec 64,
by Richard H. Bangert and Darrell E. Newell. 4 Mar 65, 85p Pub. no. 3211-65
Contract DA36 039AMC02282E, Proj. 1P6 22001A058, Task 1P6 22001A05802

Unclassified report

See also AD-444 525.

Descriptors: (*Crystal oscillators, Quartz), Temperature, Frequency, Stability, Thermistors, Aging(Materials), Networks, Resistors, Reliability, Mathematical analysis, Corrections, Programming(Computers).

Work was performed to achieve two major objectives: (1) develop ovenless quartz crystal oscillators having frequency stabilities heretofore obtainable only with oven controlled oscillators over wide temperature ranges; and (2) find methods for standardizing both the oscillator configuration and the methods of obtaining the component values required for compensation. In attempting to achieve the desired stability characteristics, problems were encountered with component tolerances, crystal characteristics, crystal measurement irregularities, and compensation network component selection. A method of standardizing component value selection by computer methods was tried and, within the limitations of the computer used, proved to be quite successful. The three groups of TCXO's were fabricated and tested and found to meet or approach design goal requirements.

AD-617 187 Div. 8/2
CFSTI Prices: HC$3.00 MF$0.75

Clevite Corp., Cleveland, Ohio.
RESEARCH INTO NEW APPROACHES FOR VHF FILTER CRYSTALS.
Summary rept. no. 6, 1 Aug 64-15 Jan 65,
by D. R. Curran and D. J. Koneval. 5 Apr 65, 92p
Contract DA36 039AMC02245E, Proj. 1P6 22001A058, Task 1P6 22001A058 01

Unclassified report

See also AD-600 118.

Descriptors: (*Quartz resonators, Crystal filters), (*Crystal filters, Very high frequency), Electrodes, Radiofrequency filters, Quartz crystals, Theory, Resonance, Vibration, Etched crystals, Design, Piezoelectric crystals.

Energy trapping theory has been applied to obtain a normalized expression relating harmonic overtone modes and the inharmonic overtone series associated with each, for idealized thickness shear and thickness twist modes, to a resonator design parameter which includes both electrode dimension and effective electrode mass-loading. From this, a generalized resonator design criterion is proposed. A major series of experiments with fundamental, 3rd, and 5th overtone resonators at 10, 30, and 50 Mc has been performed to confirm theory and obtain improved values for the generalized resonator design criterion. These principals have been used to obtain substantial improvement in performance for resonators at 10, 30, 60, and 90 Mc in several structural configurations. (Author)

AD-617 192 Div. 8/3, 8/4
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
STUDIES OF FIELD EMISSION AND ELECTRICAL BREAKDOWN BETWEEN MICRON-SIZED AREAS,
Technical rept.,
by Hans Hieslmair. Mar 65, 20p
Rept. no. ECOM-2583
Proj. 1P6 22001A055, Task 1P6 22001A055 01

Unclassified report

Descriptors: (*Field emission, Electrodes), (*Electrodes, Surface area), Electric discharges, Electric currents, Avalanche diodes, Microscopes.

In a modified 'Muller' microscope capable of controlled movements of one electrode to an accuracy of several hundred Angstrom units, a polished nickel surface has been scanned with a micron-sized positive electrode (collector) at distances of several microns. First results indicate that at certain localized sites the emission current passes through a maximum while moving the collector approximately parallel to the polished nickel surface. The current-voltage characteristics of this emission current satisfies the Fowler-Nordheim equation, thus indicating that field emission is involved. Some of the emitted electrons pass the rim of the collector and are accelerated towards a phosphor screen, where they produce a sickle-type emission pattern. In some cases several distinctly emitting sites could be observed from areas as small as 0.00002 sq cm. Further tests using this small-area collector method are planned in the near future. (Author)

AD-617 216 Div. 7/3

Oklahoma State Univ., Stillwater.
CONTACT PROBLEMS IN BEAT-FREQUENCY-BRIDGE FIELD-EFFECT MEASUREMENTS,
by J. E. Houston and E. E. Kohnke. 6 Aug 64, 1p
Contract Nonr259501 Unclassified report

Pub. in Proceedings of the IEEE v53 n1 p89-90 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electric terminals, Surface properties), (*Electromagnetic fields, Electric terminals), Crystals, Electric connectors, Electromagnetic properties.

10. Energy Conversion (Non-propulsive)

AD-616 549 Div. 7/6, 7/1, 4/4
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., Corona, Calif.
CHEMOELECTRIC ENERGY CONVERSION FOR NONAQUEOUS RESERVE BATTERIES.
Quarterly rept. no. 7, Jan-Mar 65,
by R. E. Panzer, W. S. Harris, J. C. Daley, G. E. McWilliams, and W. C. Spindler.
15 Apr 65, 54p
Tasks RRE06 017 211 1F009 06 05, R360FR104 211 1R011 01 01
NAVWEPS 8813
Unclassified report

Descriptors: (*Energy conversion, Electrochemistry), (*Batteries + components, Ammonia), Oxidizers, Electrolytes, Electrical conductance, Voltage, Power.

Progress for the quarter is reported on the following projects: Nonaqueous Solvent Electrochemistry; Electroreduction of Organic Cathode Materials in Liquid Ammonia Solutions; Ammonia Cell Exploratory Development; and Analysis and Evaluation of Experiments. (Author)

AD-616 639 Div. 7/6, 7/5, 18/1
CFSTI Prices: HC$2.00 MF$0.50

Monsanto Research Corp., Everett, Mass.
SELF-CONTAINED GENERATOR FOR SHELTER USE.
Final rept. for 1 Jul 63-30 Jun 64,
by Bela M. Fabuss and Alexander S. Borsanyi.
15 Oct 64, 48p Rept. no. MRB6024F
Contract OCD PS64 7, Proj. 1400, Task 1410
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Generators, Shelters), (*Hydrogen peroxide, Decomposition), (*Life support, Shelters), Steam turbines, Oxygen, Steam, Water, Power supplies, Electric power production, Pressure.

A self-contained generator was designed, assembled, and operated to provide oxygen, water, and electric power in shelters through the decomposition of 90% hydrogen peroxide. The decomposition of hydrogen peroxide in this self-pressurizing unit resulted in complete conversion to oxygen and water at 1300F and pressures up to 200 psig. A high speed 2 kw turbine, specially designed and manufactured by General Thermodynamics Corp. for this project, was successfully operated in conjunction with a high speed generator. The maximum overall efficiency of the system was 63.4 per cent. For a 100-man shelter, 19.3 lb/hr or 40 gallons per day of 90% hydrogen peroxide will provide the minimum oxygen and water requirement and yield about 0.55 kw (continuous) electrical power or 13.2 kw-hr per day of electrical energy. (Author)

AD-616 779 Div. 7/1, 4/4
CFSTI Prices: HC$2.00 MF$0.50

Electrochemistry Lab., Univ. of Pennsylvania, Philadelphia.
REVERSIBLE OXYGEN ELECTRODES.
Quarterly rept. no. 12 (final) for 1 Oct-31 Dec 64,
by M. Genshaw, V. Brusic, and A. Damjanovic.
31 Dec 64, 36p
Contract DA36 039SC88921, Proj. 1C6 22001A053, Task 1C6 22001A053 04
Unclassified report

See also AD-449 408.

Descriptors: (*Fuel cells, Electrodes), (*Cathodes (Electrolytic cells), Oxygen), (*Oxygen, Reduction (Chemistry), Electrochemistry, Platinum, Hydrogen peroxide, Adsorption, Electrolytes, Films, Acids, Bases(Chemistry), Catalysis, Reaction kinetics.

Achievements during the course of the Project have been briefly summarized. A rotating disk electrode with a concentric ring was shown to be a valuable tool in discriminating between possible mechanisms in 02 reduction. On platinum electrodes in highly purified acid solutions the reduction is a 4-electron process until the electrode potential below 0.1 V with respect to N.H.E., when H202 starts forming. At 0.00 V, nearly all current is due to H202 formation. In not highly purified solutions, the current on the disk shows a maximum which is less than the limiting current, and then with the potentials becoming more cathodic, current decreases. This deactivation is due to the adsorption of the impurities, and the correlation between the shape of the oxygen reduction curve and an adsorption isotherm is apparent. In alkaline solution H202 is an intermediate. Possible mechanisms for 02 reduction are discussed for both acid and alkaline media. (Author)

AD-616 784 Div. 7/6, 7/5
CFSTI Prices: HC$1.00 MF$0.50

Minnesota Mining and Mfg. Co., St. Paul.
300 WATT PORTABLE THERMOELECTRIC GENERATOR.
Monthly progress rept. no. 8 for period ending 31 May 65,
by R. D. Carlton. 31 May 65, 6p
Contract N600 61533 62758
Unclassified report

See also AD-612 602.

Descriptors: (*Thermoelectricity, Power supplies), (*Generators, Thermoelectricity), (*Electric power production, Thermoelectricity), Portable, Thermocouples, Energy conversion, Life expectancy, Heat transfer, Voltage regulators.

Two 5 couple modules were constructed and put on life test. A 9-couple module of the design which will be used in the generator was constructed and tested. Thermal experiments on cold-end heat transfer were completed and couple hardware design was finalized. A prototype voltage regulator was built and tested. (Author)

AD-617 071 Div. 7/6, 7/5
CFSTI Prices: HC$6.00 MF$1.25

General Electric Co., Pleasanton, Calif. Special Purpose Nuclear Systems Operation.
DEVELOPMENT AND DEMONSTRATION OF AN ADVANCED SOLID STATE RADIOISOTOPE POWER SUPPLY.
Rept. for Jul 61-Sep 63.
Apr 65, 217p Rept. no. GEST-2023
Contract AF33 616 8256, Proj. 4159, Task 42027
AL TDR-64-115 Unclassified report

Descriptors: (*Power supplies, Thermoelectricity), (*Generators, Thermoelectricity), (*Thermoelectricity, Radioactive isotopes), (*Radioactive isotopes, Thermoelectricity), Thulium, Thoruim, Surface properties, Thermocouples, Iron, Lead alloys, Tellurium alloys, Hot working, Life expectancy, Packaging.

Development of a low power radioisotope electric generator using thermoelectric converters is described. The basic concept was to develop a 'pencil' module of thermoelectric legs with integrated radioisotope fuel pellets at the hot junctions with particular emphasis on hot pressing techniques. The use of hop pressing techniques did not produce truly successful integral interface junctions of thermoelectric material to hot and cold junction components. However, a combination of hot pressing end caps to the thermoelectric legs and use of spring loaded contacts did work. This increased the inherent hot and cold junction contact resistances and resulted in lower generator efficiencies than initially planned. A prototype power generator unit containing 12 thermoelectric modules was assembled and tested. Thulium metal was proven to be incompatible with thermoelectric material and could not be diffusion bonded. A 'separable' concept was conceived using Th-170 as the heat source and thin ceramic tubes for alignment purposes. Eleven tests on the power generator were conducted for a total of 1028 hours at peak loading condition. Test data compared favorably to the theoretically calculated performance data. (Author)

AD-617 132 Div. 7/6, 7/5, 25/3
CFSTI Prices: HC$2.50 MF$1.00

Naval Research Lab., Washington, D. C.
DIRECT ENERGY CONVERSION LITERATURE ABSTRACTS.
Bibliography no. 9,
comp. by Eileen Pickenpaugh. Jun 65, 119p

Descriptors: (*Energy conversion, Bibliographies), (*Bibliographies, Energy conversion), Thermoelectricity, Thermionic emission, Photoelectric effect, Electrochemistry, Magnetohydrodynamics, Energy, Abstracting.

This is the ninth in a series of bibliographies covering unclassified literature related to the direct conversion of energy. Subject coverage includes thermoelectricity, thermionic emission, photoelectric processes, magnetohydrodynamics, electrochemical processes, energy storage, and energy sources.

11. Materials

AD-616 466 Div. 17/2, 4/2

McMaster Univ., Hamilton (Ontario). Dept. of Metallurgy and Metallurgical Engineering.
BREAKAWAY PHENOMENA IN THE OXIDATION OF ZIRCONIUM AT 850 AND 950c,
by G. R. Wallwork, C. J. Rosa, and W. W. Smeltzer.
2 Jul 64, 15p
Grant AF AFOSR515 64, Proj. 9763, Task 9763 01
AFOSR 65-0788
Unclassified report

Pub. in Corrosion Science v5 p113-20 1965 (Copies available only to DDC users).

Descriptors: (*Zirconium, Oxidation), (*Oxidation, Reaction kinetics), (*Oxygen, Diffusion), Zirconium compounds, Oxides, Scale, Corrosion, Solid solutions, Water vapor, Metallography, Stresses, Metal films, Thermal properties, Canada.

An investigation is reported on the deviations from parabolic oxidation kinetics to more rapid rates for zirconium at 850 and 950C. Stresses in the oxide and in metal containing oxygen in solid solution induced cracks in both phases and permitted increased localized oxidation. Small voids were observed at the metal/oxide interface in metallographically prepared sections of oxidized specimens and a duplex scale was formed by cracking between these voids. A distinctly different type of scale was produced where the metal had cracked. Growth of this type of scale could also be induced by injecting small amounts of water vapour in the oxygen atmosphere and resulted in catastrophic failure of the specimens. (Author)

AD-616 520 Div. 14/6
CFSTI Prices: HC$1.00 MF$0.50

Watervliet Arsenal, N. Y.
EFFECT OF FIBER GEOMETRY ON STRESS IN FIBER-REINFORCED COMPOSITE MATERIALS, PHASE 1.
Technical rept.,
by Thomas F. MacLaughlin and Michael J. Salkind.
May 65, 23p Rept. no. WVT-6521
Proj. 1C 014501B33A
Unclassified report

Descriptors: (*Composite materials, Fibers), (*Fibers, Reinforcing materials), Glass textiles, Single crystals, Stresses, Mathematical analysis, Photoelasticity, Models(Simulation), Geometric forms, Shear stresses.

Five photoelastic models of fiber-reinforced composite material configurations were designed for the purpose of investigating the effects of various fiber end shapes and broken fibers on the shear stress distribution in an elastic matrix. Maximum shear stresses along fiber boundaries in the vicinity of fiber discontinuities are presented. Stress distributions resulting from square-ended, round-ended and pointed fibers were found to be similar. Peak stresses in 'broken' fibers were about twice as high, and decreased with increasing gap length between fiber ends. A description of future configurations to be investigated is presented. (Author)

AD-616 721 Div. 14/10, 13/4, 14/6
CFSTI Prices: HC$3.00 MF$0.75

Texas A. and M. Univ., College Station.
THE FEASIBILITY OF USING PAPERBOARD AS A BASIC MATERIAL FOR HOUSING SHELTERS.
Master's thesis,
by Roscoe Paul Thorpe. May 65, 76p
Unclassified report

Descriptors: (*Housing, Composition board), (*Composition board, Housing), Construction, Design, Buildings, Housing projects, Cylindrical bodies, Parabolic bodies, Structural shells, Roofs, Sandwich panels, Honeycomb cores, Population, Costs, United States Government, Feasibility studies, Portable.

The objectives of the thesis were divided into three major parts. The first objective was to explore and to show a need for very light weight, non-permanent, easily transportable, low cost structures. Major requirements discussed in detail are (1) housing shelters for underdeveloped countries; (2) military and civil defense requirements; and (3) low income housing in the United States. The second objective involved a broad consideration of the materials and of the elements of structure. The third objective of the study was to show by actual construction of prototype structures the potential advantages of paperboard material. Three structures were built in an attempt to emphasize different aspects of the nature of the paper material and its combination with other materials.

AD-616 757 Div. 14/9, 2/7
CFSTI Prices: HC$4.00 MF$1.00

Kaysam Corp., of America, Paterson, N. J.
NEOPRENE ELASTOMERS FOR BALLOON FABRICATION.
Final rept. for 1 Mar 64-28 Feb 65,
by Eric Nelson. 28 Feb 65, 137p
Contract DA36 039AMC03737E, Proj. 1V025001A126
Unclassified report

Descriptors: (*Synthetic rubber, Meteorological balloons), (*Meteorological balloons, Synthetic rubber), Aging(Materials), Degradation, Performance(Engineering), Films, Polymers, Flight testing.

Dry neoprene polymers can be successfully evaluated for meteorological balloon purposes by using a solution dipping technique. This is of considerable value since it provides a method of determining suitability of polymers for balloons without first producing them in latex form. Evaluation of neoprene latex LD-569 revealed interesting physical properties, but difficulty was encountered in producing balloons from it. Study of antioxidants resulted in development of a compound with superior resistance to heat and oxygen aging. Several filter media for latex compounds were evaluated. No evidence was obtained that improvement in balloon uniformity could be obtained. Photomicrographic examination of compounding ingredients and balloon films show little evidence that improperly dispersed solid material can act as a point of weakness, but did show how easily the balloon film can suffer surface damage by abrasion. Evidence was obtained that strongly suggests that better flight performance can be expected if balloons are cured at lower temperatures than those that produce optimum laboratory physical characteristics. Excellent flight performance was obtained with balloons made from a high elongation compound. Altitudes up to 140,000 feet were obtained on a dependable basis. (Author)

AD-616 803 Div. 14/6

Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy.
PLASTIC DEFORMATION AND FAILURE OF SILVER-STEEL FILAMENTARY COMPOSITES,
by Henry R. Piehler. 20 Mar 64, 5p
Contract AF49 638 775
AFOSR 65-0916
Unclassified report

Pub. in Transactions of the Metallurgical Society of AIME v233 p12-6 Jan 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Silver, Composite materials), (*Composite materials, Silver), (*Steel, Reinforcing materials), (*Fiber metallurgy, Composite materials), Filaments, Wire, Deformation, Failure(Mechanics), Tensile properties, Fracture(Mechanics), Stresses, Microstructure.

Continuous seven - and nineteen-filament close-packed silver-steel filamentary composites were tested in tension. For purposes of comparison, the tensile behavior of the composite was predicted from the measured properties of the individual components. It was assumed that the axial strain is the same in both components and that the contribution of each component to the composite flow stress is proportional to its volume fraction. Good agreement was obtained between the observed and predicted tensile behavior. However, the composite elongation at fracture was about twice that observed when the individual steel wires were tested alone. Composites in which the filaments were widely spaced failed by the consecutive fracture of the filaments. In composites with closely spaced filaments, a composite instability preceded fracture. These effects are explained in terms of a lateral restraint to the necking of the filaments which develops in the deforming composite. (Author)

AD-616 863 Div. 17/2, 17/7, 25/2

Alberta Univ., Edmonton.
THE ALPHA TO EPSILON TRANSFORMATION IN POLYCRYSTALLINE COBALT,
by M. J. Bibby and J. Gordon Parr. 1963, 5p
Grant DBR9535 16
Unclassified report

Pub. in Cobalt n20 p1-3 Sep 1963 (Copies available only to DDC users).

Descriptors: (*Cobalt, Transformations), Martensite, Transition temperature, Crystal structure, Quenching-(Cooling), Phase studies.

A study was made to investigate the transformation markings on cobalt, and to determine the effect of very high quenching rates on the transformation temperature.

AD-616 900 Div. 14/8, 8/2, 4/3
CFSTI Prices: HC$1.00 MF$0.50

Texas Instruments, Inc., Dallas.
ORGANIC MATERIALS FOR ELECTRONIC APPLICATIONS.
Interim technical rept. no. 5, 1 Feb-30 Apr 65,
by Bernard G. Carbajal, III. 30 Apr 65, 21p
Rept. no. TI-08-65-70
Contract AF33 615 1364
Unclassified report

Descriptors: (*Organic materials, Electronic equipment), (*Polymers, Electronic equipment), (*Thin films(Storage devices), Dielectric properties), Dielectric films, Complex compounds, Styrene plastics, Glow discharges, Polymerization, Magnetic tape, Electric insulation, Capacitors, Glass, Refractive index, Conductivity, Resistance(Electrical), Voltage, Temperature.

The work program will consist of a study of the dielectric properties of thin polymeric organic films, an investigation of conduction mechanisms in metal chelate polymers, and a study of electrical contacts to implement the other studies. Glow-discharge polymerized (GDP) thin films were successfully applied as thin insulating layers on magnetic memory planes. Dielectric evaluation studies, including the determination of dielectric constant, refractive index, resistivity, and elevated temperature storage were initiated on GDP styrene deposited on glass substrates. Variations in the conditions of formation of GDP styrene were included.

AD-616 914 Div. 14/2, 25/2
CFSTI Prices: HC$2.00 MF$0.50

Lexington Labs. Inc., Cambridge, Mass.
EVALUATION OF VAPOR DEPOSITION GROWTH OF OXIDE SINGLE CRYSTALS FROM METAL HALIDES.
Final rept. 1 May 64-30 Apr 65,
by Philip S. Schaffer. May 65, 44p
Contract Nonr457400, ARPA Order 306
Unclassified report

See also AD-613 296.

Descriptors: (*Ruby, Crystal growth), (*Sapphires, Crystal growth), (*Crystal growth, Vapor plating), (*Vapor plating, Crystal growth), Single crystals, Reaction kinetics, Crystal lattice defects, Density, Aluminum compounds, Oxides, Halides, Impurities, Chromium compounds, Heat of activation.

A vapor phase growth technique was developed for the epitaxial growth of oriented ruby monocrystals. Crystals were grown up to 90.7 grams in 52 hours. Detailed investigations were made to determine the variables which influenced the formation kinetics of the reaction system represented by the following equation: (2-x)AlCl3(g) + xCrCl3(g) + 3H2(g) + 3CO2(g) reversibly yields CrxAl(2-x)O3(s) + 3CO(g) + 6HCl(g) where x >O and x = O for ruby and sapphire, respectively. These variables included substrate temperature, total pressure, orientation, reactant gas velocity and reactant gas partial pressures. Crystals were grown with total impurity levels as low as 4 ppm. Dislocation density decreased with increasing thickness of vapor overgrowth. Densities as low as 13/sq cm were measured on large vapor-grown alpha-Al2O3 platelets, although the vapor-grown monocrtstals generally exhibited a density reduction of one to three orders of magnitude over their flame fusion substrates. (Author)

AD-616 919 Div. 17/4, 17/6
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
FRACTURE-TOUGHNESS TESTS FOR TITANIUM ALLOY PLATE AND FORGINGS.
Interim progress rept.,
by R. W. Huber and R. J. Goode. 21 Apr 65, 10p
Rept. no. NRL-6228
Projs. RR007 01 46 5405, SR007 01 02 0704
Unclassified report

Prepared for presentation at the 1964 AIME Symposium on Fracture Toughness, Philadelphia, Pa., 20 Oct 64.

Descriptors: (*Titanium alloys, Fracture(Mechanics)), (*Fracture(Mechanics), Titanium alloys), Toughness, Metal plates, Forging, Submarine hulls, Tests, Density.

The notch fracture-toughness characteristics of titanium alloy plate are being investigated to provide alloy selection design and specification criteria for the use of titanium alloys as hull materials for deep-diving submarines and for other structural applications. Although the Navy's primary interest is in 120-ksi yield strength alpha or near-alpha titanium alloys, the entire

spectrum of titanium alloys is under study. The results obtained from laboratory fracture-toughness tests, such as the Charpy V-notch test (C sub v) and the newly developed NRL drop-weight tear test (DWTT), are correlated with explosion tear test (ETT) results. The explosion tear test is a simulated submarine-hull structural prototype test in which the metal is explosion loaded to establish its plastic deformation capability in the presence of a crack-like flaw. Variations in notch fracture-toughness associated with alloy composition and interstitial level, processing, heat treatment, microstructure, and weld deposits were evaluated and assessed with the various fracture-toughness tests. The results of these studies show that it is possible to predict the expected structural performance of the titanium plate and forgings from the DWTT energy values through the correlation with the ETT. The relationships of the C sub v test and the DWTT have been established for these materials. (Author)

AD-616 920 Div. 14/6
CFSTI Prices: HC$0.50 MF$0.50

Naval Research Lab., Washington, D. C.
SOME SURFACE CHEMICAL ASPECTS OF GLASS-RESIN COMPOSITES. PART II. THE ORIGIN AND REMOVAL OF MICROVOIDS IN FILAMENT-WOUND COMPOSITES.
Interim rept.,
by W. D. Bascom. 24 May 65, 9p
Rept. no. NRL-6268
Proj. RR001 02 01
Unclassified report

Descriptors: (*Composite materials, Filament wound construction), (*Filament wound construction, Composite materials), Glass, Plastics, Air, Impregnation, Filament, Bubbles, Winding, Surface tension, Surface-active substances, Epoxy plastics.

Previous work of this program established that a very considerable number of air microvoids are entrained in the glass roving during the winding of glass-resin composites. Air entrapment results from the difficult capillary penetration of resin into spaces between filaments during the impregnation process. The poor resin wettability of commercially finished filaments aggravates the situation. Microscopic examination has shown that the microvoids observed in glass-filament rovings are also present in cured, filament-wound composites, prepreg roving, and glass-resin laminates. The voids are present to the extent of 10 to the 7th power to 10 to the 9th power cu. in., are about 0.4 mil in diameter, and have lengths from 0.4 to 20 mils and even greater. A microscopic examination was made of the process of resin impregnation into a strand of glass filaments under simulated winding conditions with particular attention given to the effect of the operating variables on air entrapment. When the contact angle of the resin against the individual filaments was nonzero the void content was too high to be measurable, even at low resin viscosities and slow strand speeds. On the other hand, reducing the contact angle to zero or causing the tension to oscillate as the strand passed through the resin markedly reduced the number of voids. A combination of good wetting and oscillating strand tension gave better results than either alone. These observations can be explained in terms of the forces that obstruct the release of the air bubbles from between filaments. (Author)

AD-616 925 Div. 17/5
CFSTI Prices: HC$3.00 MF$0.75

United States Steel Corp., Monroeville, Pa. Applied Research Lab.
COMPOSITION REFINEMENT STUDY, 5Ni-Cr-Mo-V STEEL.
Technical rept.,
by S. J. Manganello, L. F. Porter, R. J. Sitko, and B. K. Stewart. 1 Mar 65, 71p
Contract NObs88540, Projs. 39 018 001 41, SR007 01 01, Task 853
Unclassified report

Descriptors: (*Steel, Nickel alloys), Chromium alloys, Molybdenum alloys, Vanadium alloys, Heat treatment, Tensile properties, Metal plates, Thickness, Toughness, Statistical analysis, Microstructure, Shock resistance, Chemical analysis.

Studies to date have shown that a 0.10 C, 0.75 Mn, 5.0 Ni, 0.55 Cr, 0.55 Mo, 0.07 V steel is very promising as an HY-130/150 steel. However, the minimum yield-strength range (130 to 150 ksi) and the plate-thickness range of interest (1/2 through 6 inches) are quite broad and may demand composition modifications to meet the full range of HY-130/150 requirements. Therefore, the yield-strength and thickness requirements were broken down into four classes: (1) 130 to 145 ksi through 3 inches, (2) 140 to 155 ksi through 3 inches, (3) 130 to 145 ksi in 3 through 6 inches, and (4) 140 to 155 ksi in 3 through 6 inches; and a statistically designed program was initiated to determine the changes in the manganese, nickel, chromium, and molybdenum contents of the 5Ni-Cr-Mo-V steel that would be needed to meet the various requirements. The results showed that no modifications in the standard composition of the 5Ni-Cr-Mo-V steel are needed to meet requirements (2) and (3), and that requirement (1) could be met by lowering the molybdenum to about 0.40 percent. Requirement (4) could not be met by simply increasing the hardenability because the Charpy V-notch energy absorption fell below 60 ft-lb at 0 F. Further examination of the results of the present study on Laboratory steels indicates that the best combination of strength and toughness is achieved when the manganese is decreased and the nickel is increased. (Author)

AD-616 928 Div. 17/5, 26/1
CFSTI Prices: HC$2.00 MF$0.50

United States Steel Corp., Monroeville, Pa. Applied Research Lab.
STUDIES OF CARBON-CONTAINING MARTENSITIC STEELS FOR AN HY-180/210 WELDMENT.
Technical rept.,
by D. S. Dabkowski, S. J. Manganello, and L. F. Porter. 1 Mar 65, 42p Rept. nos. S-21102, S-21103-1
Contract NObs88540, Projs. 39 018 002 28, SS050 000, Task 1567
Unclassified report

Descriptors: (*Steel, Welds), (*Welds, Steel), Martensite, Carbon alloys, Cobalt alloys, Vanadium alloys, Tantalum alloys, Niobium alloys, Tungsten alloys, Titanium alloys, Aluminum alloys, Heat treatment, Hardening, Toughness, Shock resistance, Nickel alloys.

Studies were made on 3 to 9 percent nickel quenched and tempered steels to investigate the effects of variation in carbon content, strengthening through the addition of cobalt, and secondary hardening through the addition of vanadium, tantalum, columbium, tungsten, titanium, and aluminum. The results show that the steels must be tempered at low temperatures (about 400 F) to meet the yield-strength requirement unless supplementary strengthening mechanisms are employed or the carbon content is increased above 0.25 percent. When the steels were strengthened by the addition of cobalt or secondary-hardening or age-hardening elements, the desired strength was obtained at a carbon content of 0.20 percent and at tempering temperatures as high as 1000 F. On a strength-toughness basis, the most attractive strengthening agents were cobalt, vanadium, tantalum, and aluminum. At a

yield strength in the range 180 to 185 ksi, the most promising carbon-containing martensitic steels absorbed 39 to 44 ft-lb at 0 F. However, an 0.07C-9Ni-4Co-1Mo-0.3Al steel exhibited exceptional notch toughness (140 ft-lb at 0 F) at a yield strength of 162 ksi. (Author)

AD-616 929 Div. 17/5, 26/1, 31/4
CFSTI Prices: HC$2.00 MF$0.50

United States Steel Corp., Monroeville, Pa. Applied Research Lab.
EFFECT OF STRESS-RELIEF TREATMENTS ON THE MECHANICAL PROPERTIES OF 5NI-CR-MO-V WELDMENTS.
Technical rept.,
by L. P. Connor and A. M. Rathbone. 1 Mar 65, 34p Rept. no. S-12501
Contract NObs88540, Projs. 39 018 001 43, SR007 01 01, Task 853

Unclassified report

Descriptors: (*Steel, Welds), (*Submarine hulls, Metal plates), (*Heat treatment, Steel), Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Mechanical properties, Stresses, Manganese alloys, Nickel alloys, Tensile properties, Transition temperature, Microstructure, Brittleness, Shock resistance.

A study was made to determine the effects of stress relieving on the mechanical properties of the weld-heat-affected zone and weld metal in 5Ni-Cr-Mo-V weldments. The impact properties of grain-coarsened heat-affected zones were determined for two production heats of 5Ni-Cr-Mo-V steel and for two Laboratory heats of modified 5Ni-Cr-Mo-V steel. In addition, the tensile and impact properties of stress-relieved 2Mn-2Ni-Cr-Mo weld metal were determined. The results indicated that the transition temperature of the as-welded grain-coarsened region (-100 F) was almost as low as that of the unwelded plate (-165 F). In contrast, a moderately extensive stress relief (16 hours) increased the transition temperature of the heat-affected zone of the 5Ni-Cr-Mo-V normal-manganese production steels to about 175 F for air cooling after stress relieving and to about 265 F for furnace cooling after stress relieving. However, the same stress relief increased the transition temperature of the heat-affected zone of the low-manganese 5Ni-Cr-Mo-V steel only to 25 F for both cooling rates after stress relieving. Results of mechanical-property tests on stress-relieved 2Mn-2Ni-Cr-Mo weld metal indicated that the stress-relief treatment did not cause a sifnificant loss in yield strength but did cause a moderately large increase in Charpy V-notch transition temperature (from -130 to +100 F). (Author)

AD-616 930 Div. 17/5, 26/1, 31/4
CFSTI Prices: HC$2.00 MF$0.50

United States Steel Corp., Monroeville, Pa. Applied Research Lab.
PRELIMINARY EVALUATION OF INTERRUPTED-ARC WELDMENTS.
Technical rept.,
by L. P. Connor and A. M. Rathbone. 1 Mar 65, 28p Rept. no. S-12403
Contract NObs88540, Projs. 39 018 001 42, SR007 01 01, Task 853

Unclassified report

Descriptors: (*Steel, Welds), (*Submarine hulls, Metal plates), (*Welding, Steel), Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Welding rods, Manganese alloys, Mechanical properties, Carbon dioxide, Electric arcs, Gases, Microstructure, Toughness.

A study was made in which experimental interrupted-arc HY-130/150 weldments were fabricated in the vertical-up position by welders having different levels of experience and with two different shielding-gas mixtures. The desired mechanical properties of the interrupted-arch weld metal (140 ksi yield strength and 50 ft-lb energy absorption at 0 F) were achieved and no significant difference was observed in soundness or properties between weldments fabricated by an experienced interrupted-arc welder and weldments fabricated by experienced covered-electrode welders trained in interrupted-arc welding for about one week. The study also indicated that carbon dioxide in the shielding gas does not have significant deleterious effects on weld-metal mechanical properties. Therefore, moderate quantities of carbon dioxide (about 10 percent) can be effectively used to increase arc penetration. In general, the present results indicate that satisfactory mechanical properties and soundness can be obtained in out-of-position interrupted-arc HY-130/150 weldments, and that the interrupted-arc process can be effectively used for shipyard construction. (Author)

AD-616 932 Div. 17/5, 26/1, 31/4
CFSTI Prices: HC$2.00 MF$0.50

United States Steel Corp., Monroeville, Pa. Applied Research Lab.
DEVELOPMENT OF AN HY-130/150 WELDMENT.
Progress rept. no. 6, 1 Nov 64-28 Feb 65,
by L. F. Porter, A. M. Rathbone, S. T. Rolfe, W. T. DeLong, and K. E. Dorschu. 1 Mar 65, 28p
Rept. no. S-10000-6
Contract NObs88540, Projs. 39 018 001 44, SR007 01 01, Task 853

Unclassified report

Descriptors: (*Steel, Welds), (*Submarine hulls, Metal plates), (*Welding, Steel), Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Heat treatment, Thickness, Mechanical properties, Welding rods, Manganese alloys, Welding, Shock resistance, Fracture(Mechanics).

Studies were made to complete the laboratory phases of an HY-130 weldment development. Final laboratory composition studies showed that the standard 5Ni-Cr-Mo-V steel can meet the mechanical-property requirements for an HY-130 base metal in plates through 6 inches thick. A fourth 80-ton electric-furnace heat of the 5Ni-Cr-Mo-V steel has been produced, and the mechanical properties of plates confirm the predictions indicated by the final laboratory composition studies. The laboratory development of the Air Reduction 2Mn-2Ni-Cr-Mo MIG filler metal is essentially completed. Evaluation of this filler metal indicates that the properties of the weld metal, including those of weld metal deposited out-of-position, meet the requirements for an HY-130 weldment.

AD-616 957 Div. 14/2

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
RESEARCH PAPERS, CONFERENCE ON ZIRCONIA, 3-4 DECEMBER 1962.
Dec 64, 30p Rept. no. ARL 65-82

Unclassified report

Pub. in American Ceramic Society. Journal v47 n12 p622-48 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Symposia, Zirconium compounds), (*Zirconium compounds, Oxides), (*Ceramic materials, Zirconium compounds), Reports, Infrared spectroscopy, High-temperature research, Elasticity, Chromium,

Solubility, Crystal lattice defects, Microstructure, Titanium, Diffusion, Electrical properties, Thermal expansion, Compressive properties, Impurities.

Infrared absorption spectroscopy in zirconia research; Calculated high-temperature elastic constants for zero porosity monoclinic zirconia; Reaction in zerconia and chromium; Lattice defects in tetragonal Zr O2; Effect of metal additions on the microstructure of zirconia; Electrical properties and defect structure of zirconia: 1, Monoclinic phase; axial thermal expansion of tetragonal Zr O2 between 1150 and 1700 C; Compressive properties of titanium-modified zirconia at elevated temperatures; Compositional analysis of twenty-six zirconias.

AD-616 979 Div. 17/5, 26/1, 31/4
CFSTI Prices: HC$1.00 MF$0.50

United States Steel Corp., Monroeville, Pa.
Applied Research Lab.
FORMABILITY OF THICK 5NI-CR-MO-V STEEL PLATES.
Technical rept.,
by S. T. Rolfe. 1 Mar 65, 16p Rept. no. S-13206
Contract NObs88540, Projs. SR007 01 01, 39 018 001 40, Task 853

Unclassified report

Descriptors: (*Steel, Cold working), (*Cold working, Steel), (*Submarine hulls, Metal plates), Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Fracture(Mechanics), Heat treatment, Ductility, Thickness, Surfaces, Deformation.

One-, 2-, and 3-3/8-inch-thick plates were cold-formed in a submarine yard to the predicted minimum bend radii. The results of the cold forming showed that the actual bend radius at the onset of cracking was about the same or slightly smaller than the predicted minimum bend radius. Thus, the Laboratory procedure is quite reliable for estimating cold formability under conditions of plane strain, the state-of-stress that generally exists during cold forming of wide plates. Moreover, because the bend radii at the onset of cracking were smaller than those normally required for submarine-hull fabrication, the 5Ni-Cr-Mo-V steel has more than adequate ductility for submarine-hull fabrication. (Author)

AD-616 980 Div. 17/5, 31/4
CFSTI Prices: HC$2.00 MF$0.50

United States Steel Corp., Monroeville, Pa. Applied Research Lab.
HIGHER-STRENGTH STEEL WELDMENTS FOR SUBMARINE HULLS.
Status rept. no. 2,
by J. H. Gross. 4 Jan 65, 50p
Rept. no. S-00000-1
Contract NObs88540, Projs. SR007 01 01, 40 018 001 39, Task 853

Unclassified report

Descriptors: (*Steel, Welds), (*Submarine hulls, Metal plates), Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Maraging steels, Welding rods, Heat treatment, Mechanical properties, Welding, Structures, Mathematical analysis, Corrosion, Experimental data.

Progress is report on the development of an HY-130/150 weldment and in a study of the feasibility of developing an HY-180/210 weldment. The accomplishments to date in the HY-130/150 program indicate that a 5Ni-Cr-Mo-V steel has been developed that meets essentially all the requirements for an HY-140 steel. When the 5Ni-Cr-Mo-V steel was joined with a 140 ksi yield-strength 2Mn-2Ni MIG filler metal, the resulting weldments exhibited good performance in explosion tests. These tests also showed that when the yield strength of the weld metal matched or overmatched that of the base metal, the deformation characteristics of the weldments were satisfactory, whereas those ot an undermatching weld metal were unsatisfactory. Results of the HY-180/210 program indicate that the development of a 180 ksi minimum-yield-strength weldment having a Charpy V-notch energy absorption of about 50 ft-lb is feasible.

AD-616 981 Div. 17/5, 31/4
CFSTI Prices: HC$2.00 MF$0.50

United States Steel Corp., Monroeville, Pa. Applied Research Lab.
FEASIBILITY OF DEVELOPING AN HY-180/210 WELDMENT.
Progress rept. no. 6, 1 Nov 64-28 Feb 65,
by L. F. Porter, A. M. Rathbone, S. T. Rolfe, and K. E. Dorschu. 1 Mar 65, 28p
Rept. no. S-20000-6
Contract NObs88540, Projs. SS050 000, 39 018 002 30, Task 1567

Unclassified report

Descriptors: (*Steel, Welds), (*Submarine hulls, Metal plates), (*Welding, Steel), Welding rods, Aging(Materials), Nickel alloys, Cobalt alloys, Molybdenum alloys, Aluminum alloys, Mechanical properties, Heat treatment, Chromium alloys, Vanadium alloys, Corrosion, Stresses, Environmental tests, Thickness.

Base-metal studies completed during the sixth report period have indicated that excellent combinations of strength and roughness (60 ft-lb at 0 F in 2-inch-thick plate at a yield strength of 180 ksi) were obtained in vacuum-induction-melted production heats of 12Ni-5Cr-3Mo steel. One carbon-martensite age-hardened Laboratory-melted steel absorbed about 70 ft-lb (at 0 F) at a yield strength of 183 ksi after conventional quenching and tempering and 120 ft-lb at 180 ksi after rapid heat treatment. Some improvements in strength-toughness combinations have been observed, and special design and fabrication procedures offer promise of minimizing the strength requirements for an HY-180/210 weld metal. The resistance of promising HY-180/210 weldments to stress corrosion is being intensively investigated by conventional tests and by KIC stress-corrosion tests. A preliminary evaluation of the structural suitability of the most promising production materials is in progress. Although the HY-180/210 feasibility study is not quite completed, the development of an HY-180/210 weldment appears feasible, and a program outlining the approaches recommended for an HY-180/210 development program is being prepared. (Author)

AD-616 982 Div. 17/5, 17/2, 26/1
CFSTI Prices: HC$1.00 MF$0.50

United States Steel Corp., Monroeville, Pa.
Applied Research Lab.
STRESS-CORROSION BEHAVIOR OF 12 PERCENT NICKEL MARAGING-STEEL WELDMENTS.
Technical rept.,
by A. W. Loginow. 31 Dec 64, 18p
Rept. no. S-23309
Contract NObs88540, Projs. SS050 000, 40 001 100 3, Task 1567

Unclassified report

Descriptors: (*Maraging steels, Corrosion), (*Corrosion, Maraging steels), (*Stresses, Corrosion), (*Welds, Maraging steels), Nickel alloys, Fracture(Mechanics), Molybdenum alloys, Chromium alloys, Environmental tests, Mechanical properties,

Heat treatment, Steel, Carbon alloys, Cathodic protection.

Studies were conducted to determine the stress-corrosion properties of 12Ni-5Cr-3Mo maraging-steel weldments in marine environments. Stress-corrosion tests were conducted with welded U-bend specimens in quiescent and flowing sea water, in the tidal zone, and in a marine atmosphere. Stress-corrosion cracking was observed in specimens exposed in the three sea-water environments in 6 to 17 days; no significant difference in cracking time was observed among the environments. In the marine atmosphere the specimens showed an appreciably higher resistance to stress-corrosion cracking; the shortest cracking time in this environment was 62 days. Metallographic examination showed that, generally, the cracks initiated in the weld metal and propagated in the weld metal and in the heat-affected zone. The absence of base-metal cracking (away from welds) in some specimens exposed for 170 days is regarded as evidence that the base metal may be resistant to cracking in marine environments. It also appears that carbon steel can prevent cracking by cathodically protecting 12Ni-5Cr-3Mo weldments. (Author)

AD-617 072 Div. 14/5, 30/5
CFSTI Prices: HC$1.00 MF$0.50

Koppers Co., Inc., Monroeville, Pa.
DEVELOPMENT OF HIGH TEMPERATURE SEAL-LUBRICANT DEPOSIT EVALUATION TECHNIQUES.
Technical rept. for 1 Jan-30 Nov 64,
by Billy D. Pfoutz, William G. Knox, and Frank Gannon.
3 May 65, 25p
Contract AF33 615 1112, Proj. 3044, Task 304401
APL TR-65-3
Unclassified report

Descriptors: (*Gas turbines, Lubricants), (*Lubricants, Test methods), (*Seals(Stoppers), Effectiveness), Heat-resistant materials, Jet engines, Heaters, Design, Performance(Engineering).

Testing techniques for evaluating experimental gas turbine lubricants in face-riding main shaft jet engine seals at temperatures representative of high mach aircraft have been under development. Using the ASD Seal Rig, repeatable evaluation techniques were developed for MIL-L-9236 type lubricants that were indicative of performance in engines. The present phase of the program is directed towards refining evaluation equipment and preparing the rig for more advanced research work. During the period covered, internal seal head air heating to 1160F, preliminary evaluation studies using 0-60-19 and 0-60-18 lubricants, and engineering features of a new seal head design were investigated. An adaptor to permit the use of the seal head with Erdco test equipment is being designed. (Author)

AD-617 093 Div. 17/1, 17/6
CFSTI Prices: HC$6.00 MF$1.00

Foreign Technology Div., Wright-Patterson AFB, Ohio.
PROBLEMS OF TECHNOLOGY OF FOUNDRY PRODUCTION: COLLECTION OF ARTICLES.
3 Mar 65, 217p FTD-MT-64-89
TT 65-62529 Unclassified report

Voprosy Tekhnologii Liteinogo Proizvodstva edited machine trans. of Aviatsionnyi Tekhnologicheskii Institut, Moscow. Trudy (USSR) v49 p1-180 1961.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Casting, Structural parts), (*Aluminum alloys, Casting), (*Magnesium alloys, Casting), Silicon alloys, Casting alloys, Pressure, Degasification, Halogenated hydrocarbons, Oxidation, Reaction kinetics, Liquid metals, Crystallization, Porosity, Gases, Hydrogen, Vacuum apparatus, Solubility, Determination USSR.

Contents: Casting of large thin-walled parts by method of oriented-sequential crystallization, by V. D. Khramov and Ye. V. Mishakov; Pressure casting and its hydrodynamic bases, by V. Ya. Tarutin and Ye. S. Stebakov; Degassing aluminum-silicon alloys by hexachlorethane, by M. V. Sharov and O. I. Nikishayeva; Investigation of kinetics of oxidation of liquid aluminum, by A. Ya. Radin; Investigation of kinetics of oxidation of aluminum alloys in liquid state, by A. Ya. Radin; Formation of gas porosity in castings made from aluminum-silicon alloys, by A. P. Gudchenko; Determination of content of hydrogen in aluminum alloys by method of vacuum extraction, by A. P. Gudchenko and A. I. Leont'yev; Determination of content of hydrogen in magnesium, by A. P. Gudchenko and V. V. Serebryakov; Hydrogen in alloy ML5, by M. V. Sharov and V. V. Serebryakov.

AD-617 094 Div. 14/4, 14/8
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
LIGHT RESISTANCE OF POLYPROPYLENE AND PROPYLENE-BASE FIBER,
by L. G. Tokareva and N. V. Mikhailov. 12 May 65,
10p FTD-TT-65-21
TT 65-62530
Unclassified report

Unedited rough draft trans. of Khimicheskoe Mashinostroenie (USSR) v4 n3 p23-5 1962.

Descriptors: (*Fibers(Synthetic), Polyethylene plastics), (*Polyethylene plastics, Fibers(Synthetic)), Degradation, Ultraviolet radiation, Antioxidants, Stabilization, Polymers, Photochemistry, Additives, Phenols, Amines, Aromatic compounds, Phosphorus compounds, Sulfides, Thermal properties, USSR.

An investigation was made of the process of accelerated light aging of polypropylene and propylene base fibers and effective stabilizers were found for chemical and physico-mechanical properties of polypropylene fibers against the effect of ultraviolet radiation at higher temperature. It is shown, that the most effective stabilizers at photochemical destruction of polypropylene are: product 264-phosphite and product 26, in the presence of which at accelerated light (photo) aging there is practically total retention of the initial physico-mechanical properties of the fibers. It was established, that many stabilizers of thermooxidation destruction of polypropylene, such as for example, products 264, 264-phosphite etc. appear to be simultaneously inhibitors of photochemical reactions of polypropylene destruction. The phenomenon of combined effect of polypropylene stabilizers, which has been previously established on polyamides, allows an assumption about the possibility of creating polypropylene stabilizers with complex properties. An assumption was made, explaining the mechanism of simultaneous appearance in stabilizers of propylene fibers of inhibiting properties against thermooxidizing and light destruction of the polymer. (Author)

AD-617 108 Div. 17/2, 17/4
CFSTI Prices: HC$2.00 MF$0.50

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.

DEFORMATION PROCESSING OF ANISOTROPIC METALS.
Final rept. for 1 Jul 63-30 Jun 64,
Jan 65, 29p
Contract NOw63 0564d

Unclassified report

See also AD-603 637.

Descriptors: (*Titanium alloys, Deformation), (*Metals, Anisotropy), Plasticity, Temperature, Strain(Mechanics), Tensile properties, Compressive properties.

A procedure for the experimental determination of the yield locus which uses only uniaxial tension and compression and plane strain compression is described. The yield locus for plastically-anisotropic material can also be predicted from the Hill theory using only the uniaxial yield strength and a parameter, R, which is the ratio of width to thickness strains in a uniaxial test provided that the deformation mode and yield strength are independent of the sign of the stress. Agreement of the predicted and experimental loci was very good in the tension-tension quadrant in alpha titanium textured with (0002) normal to the sheet. Discrepancies in the compression-compression quadrant are a result of 1012 mechanical twinning with compression normal to the c axis. Some additional experiments on the temperature dependence of plastic anisotropy in titanium, and plastic anisotropy in f.c.c. solidification textures are also discussed. Finally some observations of superplasticity in Ti-5Al-2.5Sn are described. (Author)

AD-617 145 Div. 14/7, 14/2
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
ON THE WEAR RESISTANCE OF ENAMEL COATINGS,
by G. I. Belyaev and S. M. Ponomarchuk.
12 May 65, 10p FTD-TT-65-23
TT 65-62536

Unclassified report

Unedited rough draft trans. of Khimicheskoe Mashinostroenie (USSR) v6 n2 p30-2 1964.

Descriptors: (*Ceramic coatings, Wear resistance), Heat treatment, Acids, Abrasives, Tests, Hardness, Ceramic materials, Additives, Quartz, Zirconium, Feld spar, Refractory materials, USSR.

AD-617 157 Div. 17/2, 26/1
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
EFFECT OF PLASTIC DEFORMATION OF THE GAMMA PHASE ON THE STRENGTHENING OF IRON-NICKEL ALLOY DURING SUBSEQUENT MARTENSITIC TRANSFORMATION,
by Yu. N. Koval and L. G. Khandros. 24 May 65,
10p FTD-TT-65-85
TT 65-62541 Unclassified report

Unedited rough draft trans. of Akademiya Nauk URSR, Kiev. Instytut Metallofizyky. Sbornik Nauchnykh Rabot, v18 p69-73 1964.

Descriptors: (*Steel, Hardening), (*Hardening, Steel), Nickel alloys, Deformation, Phase studies, Martensite, Transformations, Iron alloys, Heat treatment, Hot working.

In an iron-nickel alloy, the increase in the hardness by thermo-mechanical processing may be separated into two component parts: the effect produced by deformation and the effect connected with martensitic conversion. With the increase in the degree of deformation, the intensification of the hardness brought about by the deformation increases, and that connected with the martensitic conversion decreases. There was not revealed any essential difference between the sizes of the mosaic blocks of the alpha-phase in the specimens subjected to different degrees of reduction (compression) in the austenite state, and in the undeformed specimens after intense cooling. (Author)

AD-617 183 Div. 14/3, 4/3
CFSTI Prices: HC$4.00 MF$1.00

Monsanto Research Corp., Dayton, Ohio.
WATER-BASE FIRE-RESISTANT HYDRAULIC FLUID FOR SUBMARINES.
Final rept. for 28 Mar 64-23 Apr 65,
by E. S. Blake, G. A. Richardson, and G. F. Deebel.
23 Apr 65, 129p
Contract NObs90270

Unclassified report

Descriptors: (*Hydraulic fluids, Synthesis(Chemistry)), (*Organic phosphorus compounds, Hydraulic fluids), Phosphates, Phosphine oxides, Phosphonic acids, Electrolytes, Viscosity, Solubility, Flammability, Stability, Compatibility, Autoignition, Corrosion, Copper, Aluminum, Additives, Submarines, Esters.

Syntheses of over 40 phosphorus esters and ester salts and numerous intermediates are reported. The ability of organic phosphorus electrolytes, as water-soluble pour-point depressants, to satisfy tentative specifications is characterized by measurements and comparisons of solubility, flammability (AIT, Flash, Fire), hydrolytic stability, sonic shear stability, compatibility with commercial thickeners (35), sea water, paint, Buna N, and corrosivity to eight metal alloys. Some flammability property comparisons of phosphorus compounds with compounds containing boron, nitrogen and sulfur are made. The study supports the premise that for the additive package of a water-base fluid to have an AIT >900F., the thickener must also possess an AIT in the 900F. range. (Author)

AD-617 196 Div. 17/2, 14/7, 26/1
CFSTI Prices: HC$2.00 MF$0.50

Rock Island Arsenal, Ill.
MULTIMETAL COATING PROCESS FOR COMPOSITE METAL ASSEMBLIES.
Technical rept.,
by Jodie Doss. May 65, 27p
Rept. no. RIA-65-1137
Proj. 1C024401A110 05

Unclassified report

See also AD-427 131.

Descriptors: (*Composite materials, Coatings), (*Magnesium alloys, Coatings), (*Aluminum alloys, Coatings), (*Steel, Coatings), (*Coatings, Corrosion inhibition), Tin coatings, Tin compounds, Phosphates, Protective treatments, Phosphate coatings, Corrosion.

Old coatings and corrosion products were removed from composite metal assemblie consisting of aluminum, magnesium and steel without an appreciable attack on the basic metals. The composite metal assemblies were recoated simultaneously with tin coatings while in a stannous pyrophosphate solution or a stannate-pyrophosphate solution. A wash primer was utilized as a coating material for the composite assemblies. Com-

parative corrosion tests were performed on the above composite metal assemblies. The tin and wash primer coatings on the metal assemblies inhibited corrosion. The recoated metal assemblies did not have the corrosion resistance of assemblies that had been coated prior to the combining of the metals into composite assemblies. (Author)

AD-617 198 Div. 17/7, 25/2, 25/6

California Univ., San Diego. Dept. of Physics.
A NEW C15 SUB b-TYPE PHASE: CaAu5,
by C. J. Raub and D. C. Hamilton. 14 Jan 64, 4p

Grant AF AFOSR344 62
AFOSR 65-0806

Unclassified report

Pub. in Journal of the Less-Common Metals v6 p486-8 1964.
(Copies available only to DDC users).

Descriptors: (*Gold alloys, Calcium alloys), (*Crystal structure, Gold alloys), (*Calcium alloys, Gold alloys), (*Superconductivity, Gold alloys), Intermetallic compounds, Solid solutions, Metallic crystals, Phase studies.

12. Mathematical Sciences

AD-616 431 Div. 15/2

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE BEHAVIOR OF LIKELIHOOD RATIOS OF STOCHASTIC PROCESSES RELATED BY GROUPS OF TRANSFORMATIONS,
by T. S. Pitcher. 19 Oct 64, 6p
Unclassified report

Pub. in The Annals of Mathematical Statistics v36 n2 p529-34 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stochastic processes, Measure theory), Transformations(Mathematics), Algebras, Functional analysis.

AD-616 468 Div. 15/1, 20/2

Cambridge Univ. (England)
HIGHER ORDER POLES IN THE S MATRIX,
by R. J. Eden and P. V. Landshoff. 10 Aug 64, 4p
Grant AF EOAR63 79, Proj. 9750, Task 9750 01
AFOSR 65-0832
Unclassified report

Pub. in The Physical Review v136 n6B pB1817-20 Dec 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*S-matrix, Complex variables), Potential theory, Nuclear resonance, Elastic scattering, Nuclear models.

A method is developed for studying the possibility of a coincidence of more than one complex pole of the S matrix so as to produce a higher order pole. It is shown thereby that complex higher order poles may be consistent with generalized unitarity, although a real higher order pole is not consistent with physical unitarity. Also discussed is the relavance of higher order poles, and of a group of simple poles, to the Wigner time-delay formula. (Author)

AD-616 497 Div. 15/2

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
SOME DISTRIBUTION-FREE K-SAMPLE RANK TESTS OF HOMOGENEITY AGAINST ORDERED ALTERNATIVES,
by Madan L. Puri. Jul 64, 14p
Contract Nonr28538
Unclassified report

Pub. in Communications on Pure and Applied Mathematics v18 n1/2 p51-63 Feb-May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Statistical analysis, Theory), Statistical tests.

AD-616 505 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AN ALGORITHM FOR THE MIXED INTEGER PROBLEM,
Revised ed.,
by Ralph Gomory. 23 Jun 60, 14p
Rept. no. P-1885
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Linear programming, Numerical analysis), (*Numerical analysis, Linear programming), Inequalities.

An algorithm is given for the numerical solution of the 'mixed integer' linear programming problem, the problem of maximizing a linear form in finitely many variables constrained both by linear inequalities and the requirement that a proper subset of the variables assume only integral values. The algorithm is an extension of the cutting plane technique for the solution of the 'pure integer' problem. (Author)

AD-616 559 Div. 15/2
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON THE FOUNDATIONS OF A THEORY OF STOCHASTIC VARIATIONAL PROCESSES,
by Richard Bellman. 9 Feb 60, 26p
Rept. no. P-1903
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Stochastic processes, Theory), (*Dynamic programming, Stochastic processes), Calculus of variations, Probability, Equations.

AD-616 561 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND GAUSSIAN ELIMINATION.
Revised ed.,
by R. Sherman Lehman. 21 Mar 60, 7p
Rept. no. P-1906
Unclassified report

Revision of manuscript dated 9 Feb 60. See also AD-603 981 and AD-605 074.

Descriptors: (*Dynamic programming, Matrix algebra), (*Matrix algebra, Dynamic programming), Statistical processes, Functions, Equations.

In a previous paper (On some applications of dynamic programming to matrix theory, Illinois J. Math., 1:297-301 (1957)), Bellman has shown that the functional equation technique of dynamic programming leads to an algorithm for solving linear equations when the matrix is a Jacobi matrix. The purpose of this note is to show that the algorithm is essentially the same as Gaussian elimination. (Author)

AD-616 571 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
TRACES, TERM RANKS, WIDTHS AND HEIGHTS,
by D. R. Fulkerson and H. J. Ryser. 29 Feb 60,
18p Rept. no. P-1922 Unclassified report

Descriptors: (*Matrix algebra, Combinatorial analysis), (*Combinatorial analysis, Matrix algebra), Linear programming, Game theory.

This is an expository paper that discusses the notions of widths and heights of (0, 1)-matrices (previously introduced by the authors), in the general setting of known results concerning traces and term ranks. Proofs are omitted throughout.

AD-616 577 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
PERTURBATION AND RENORMALIZATION. I,
by Richard Bellman and John M. Richardson.
8 Mar 60, 11p Rept. no. P-1930
Unclassified report

Prepared in cooperation with Hughes Aircraft Co.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Perturbation theory, Nonlinear differential equations), (*Nonlinear differential equations, Perturbation theory), Integral equations.

The aim of the work is to present a new formalism for obtaining the perturbation solution of a nonlinear equation. The particular equations written will be used to illustrate the technique which is quite general. Although the method employed appears to be known in the literature of mathematical physics in particular cases, its scope does not appear to have been appreciated, nor does it seem to have been exploited in the mathematical domain. Attention was restricted to obtaining the first term of the perturbation expansion, reserving for a later date the questions of higher order terms, of application to more complex functional equations, of application to specific physical problems, to the derivation of asymptotic expansions, and finally, the problem of validating the technique. (Author)

AD-616 586 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON CONTROL OF LINEAR SYSTEMS WITH TIME LAGS
by J. D. R. Kramer, Jr. 22 Mar 60, 43p
Rept. no. P-1948
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Optimization, Linear systems), (*Time-lag theory, Linear systems), Control, Dynamic programming, Equations.

AD-616 596 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
REDUCTION OF DIMENSIONALITY, DYNAMIC PROGRAMMING, AND CONTROL PROCESSES.
Rev. ed.,
by Richard Bellman and Robert Kalaba. 3 Jun 60,
12p Rept. no. P-1964
Unclassified report

Revision of manuscript submitted 11 Apr 60.

Descriptors: (*Dynamic programming, Theory), (*Time-lag theory, Control), Differential equations, Difference equations.

A major difficulty in the way of a successful systematic approach to the study of control processes by way of the theory of dynamic programming is the occurrence of processes having state vectors of high dimension. However difficult the problem is for systems ruled by a finite set of differential equations, it is several orders of magnitude more complex for systems of infinite dimensionality and for systems with time lags. By combining a technique presented earlier for dealing with finite-dimensional systems and various methods of successive approximations and quasilinearization, certain classes of control processes associated with infinite dimensional systems can be treated. The ideas are illustrated by discussing control of a system involving a time lag and control of a thermal system.

AD-616 597 Div. 15/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AN ERGODIC THEOREM,
by Richard Bellman. 11 Apr 60, 7p
Rept. no. P-1966 Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Theorems, Measure theory), (*Measure theory, Theorems), Probability, Transformations-(Mathematics).

The purpose of this note is to indicate how a simple lemma due originally to Fekete, and in generalized form to Polya-Szego, permits a simple derivation of some interesting ergodic theorems. We have already indicated some applications to dynamic programming.

AD-616 611 Div. 15/1, 30/2
CFSTI Prices: HC$2.00 MF$0.50

Computer Science Div., Stanford Univ., Calif.
ON THE MINIMIZATION OF THE NUMBER OF ARITHMETIC OPERATIONS FOR THE SOLUTION OF LINEAR ALGEBRAIC SYSTEMS OF EQUATIONS,
by V. V. Klyuev and N. I. Kokovkin-Shcherbak.
14 Jun 65, 27p Technical rept. no. CS-24
Contract Nonr22537, Proj. NR044211
TT 65-62498 Unclassified report

Trans. of Zhurnal Vychislitelnoi Matematiki i Matematicheskoi Fiziki (USSR) v5 n1 p21-33 1965.

Descriptors: (*Equations, Algebra), (*Algebra, Equations), Numerical analysis, Matrix algebra, Transformations(Mathematics), USSR.

AD-616 631 Div. 15/2
CFSTI Prices: HC$1.00 MF$0.50

Texas A. and M. Univ., College Station.
AN EXACT FORMULA FOR THE PROBABILITY THAT TWO SPECIFIED SAMPLING UNITS WILL OCCUR IN A SAMPLE OF TWO UNITS DRAWN WITH UNEQUAL PROBABILITIES AND WITHOUT REPLACEMENT,
by W. S. Connor. 1962, 7p
Grant DA ARO D3 124G93
AROD 2934:17 Unclassified report

Available copy will not permit fully legible reproduction
Reproduction will be made if requested by users of DDC
Copy is available for public sale.

Descriptors: (*Probability, Sampling), (*Sampling, Probability), Population(Mathematics, Analysis of variance.

AD-616 642 Div. 15/1
TI Prices: HC$1.00 MF$0.50

Graduate Research Center of the Southwest, Dallas, Tex.
CALCULATION OF SUBDOMINANT SOLUTIONS OF LINEAR DIFFERENTIAL EQUATIONS,
by J. E. Midgley. May 65, 20p
Grant NsG269 62

Unclassified report

Descriptors: (*Differential equations, Numerical analysis), (*Numerical analysis, Differential equations), Integration, Boundary value problems.

AD-616 667 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A MATHEMATICAL FORMULATION OF VARIATIONAL PROCESSES OF ADAPTIVE TYPE,
by Richard Bellman. 19 May 60, 26p
Rept. no. P-1991

Unclassified report

Available copy will not permit fully legible reproduction.
Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Calculus of variations, Probability), (*Probability, Calculus of variations), Stochastic processes, Control, Dynamic programming, Decision theory, Optimization, Control systems, Communication theory.

The questions discussed belong to two fields which formerly were quite disjoint, the calssical theory of probability and the classical calculus of variations. That there is now considerable overlap is due to the irse in scientific interest in the field of control processes. Although it is only within the last few years that the theory of feedback control has penetrated the academic curriculum and become a respectable member of the mathematical community, the conventional formulation is already far outmoded. In order to treat current and future problems of any significance, it is absolutely essential to introduce stocahstic elements. These, however, enter in entirely novel ways, not in the fairly well understood fashion of conventional stochastic processes, but in connection with 'learning processes,' or adaptive processes. It is shown that the functional equation technique of dynamic programming can be used to treat adaptive control processes, and that continuous processes can be defined in terms of the discrete versions. (Author)

AD-616 675 Div. 15/1
CFSTI Prices: HC$4.00 MF$1.00

Stanford Univ., Calif. School of Humanities and Sciences.
FINITE DIFFERENCE METHODS FOR THE EIGENVALUES OF LAPLACE'S OPERATOR,
by Cleve B. Moler. 27 May 65, 148p
Technical rept. CS22
Contract Nonr22537, Proj. NR044 211

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Partial differential equations, Operators-(Mathematics)), (*Operators(Mathematics), Partial differential equations), Difference methods, Complex numbers, Numerical methods and procedures.

AD-616 677 Div. 15/2, 30/2
CFSTI Prices: HC$2.00 MF$0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A PROGRAM FOR THE ESTIMATION OF POWER SPECTRA,
by Charles R. Arnold and Eric Korngold.
21 May 65, 50p Technical note no. TN-1965-16
Contract AF19 628 500
ESD TDR-65-75

Unclassified report

Descriptors: (*Programming(Computers), Statistical analysis), Series, Time, Integral transforms, Fourier analysis, Stochastic processes.

A straightforward and general program of spectral analysis has been written in FORTRAN II for the IBM 7090 and is described in this report. The analysis is valid for sequences of equidistant data sampled from realizations of second order stationary stochastic processes. Alternatively, the program may be used to estimate the transfer function gain characteristic of a linear system on the basis of its sampled output. The Inputs to the program consists of the data sequence to be analyzed and FOUR control parameters. The Output consists of listings of the estimated values and of three CALCOMP plots of: the sample auto covariance (ACV) functions, the power spectral density (PSD), and a log-log plot of the PSD. The estimated PSD is consistent, being a periodogram smoothed with Hanning weights. (Author)

AD-616 679 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

American Meteorological Society, Boston, Mass.
REDUCTION OF THE DIRECT PRODUCT OF REPRESENTATIONS OF THE PROPER HOMOGENEOUS LORENTZ GROUP,
by I. B. Levinson and A. P. Yutsis. Aug 64, 19p
Rept. no. T-R-328
Contract AF19 628 3880
TT 65-62504

Unclassified report

Privedenie Pryamogo Proizvedeniya Predstavlenii Sobstvennoi Odnorodnoi Gruppy Lorentsa. Trans. of Akademiya Nauk Litovskoi SSR, Vilna. Trudy. Seriya B n4(16) p3-16 1958. Previously translated under contract AF19 604 6113, Oct 60.

Descriptors: (*Groups(Mathematics), Matrix algebra), (*Matrix algebra, Groups(Mathematics)), Theory, USSR.

The authors examine the reduction of the direct product of any number of finite-dimensional representations of the proper homogeneous Lorentz group. It is shown that the corresponding generalized Clebsch-Gordan coefficient is expressed in the general case by the sum of the products of two factors, one of which is the generalized Clebsch-Gordan coefficient for representations of a group of three-dimensional rotations, while the other is the j-symbol whose number of parameters is 3(2r-1),

where r is the number of factors in the corresponding direct product. It is shown by direct calculations that with some simplification this j-symbol is expressed by the product of 9 j symbols, the number of which is equal to r - 1. The authors give the properties of symmetry of the ordinary Clebsch-Gordan coefficient (the case of the product of two representations) for Lorentz group representations, which they also use to express generalized Clebsch-Gordan coefficients. (Author)

AD-616 714 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

Texas A and M Univ., College Station.
ASYMPTOTIC EXPANSIONS OF BESSEL FUNCTIONS BY THE METHOD OF STEEPEST DESCENTS.
Master's thesis,
by Larry Herbert Buss. May 65, 48p
Contract AF33 608 1120

Unclassified report

Descriptors: (*Bessel functions, Series), (*Series, Bessel functions), Calculus of variations, Special functions(Mathematical), Power series.

AD-616 715 Div. 15/1
CFSTI Prices: HC$3.00 MF$0.75

Texas A and M Univ., College Station.
SOLUTIONS OF DIFFERENTIAL EQUATIONS BY LINEAR PROGRAMMING TECHNIQUES.
Master's thesis,
by Jake Lee Saye, Jr. May 65, 64p
Contract AF33 608 1120

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Linear programming, Differential equations), (*Differential equations, Linear programming), Boundary value problems.

AD-616 722 Div. 15/2
CFSTI Prices: HC$3.00 MF$0.75

Texas Technological Coll., Lubbock. School of Engineering.
THE EFFECT OF THE NORMALITY AND HOMOGENEITY OF VARIANCE ASSUMPTIONS UPON THE VALIDITY OF THE F TABLE FOR INTERACTION TERMS.
Master's thesis,
by Curtis O. Zeigler. May 65, 76p
Contract AF33 608 1119

Unclassified report

Descriptors: (*Analysis of variance, Statistical tests), (*Statistical tests, Analysis of variance), Combinatorial analysis, Statistical distributions, Programming(Computers).

The purpose of this thesis is to investigate the validity of the F Table under the following conditions: first, when the assumption of common variance is violated and, secondly, when both the normality and homogeneity of variance assumptions are violated. Using a factorial design, with special interest in the effects upon interactions, this investigation is concerned with the validity of the F Table by simulating experiments with the data source being from different distributions, each containing an uncommon variance.

AD-616 727 Div. 15/2, 26/2
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SOME TABLES OF THE NEGATIVE BINOMIAL DISTRIBUTION AND THEIR USE.
Memo.,
by Bernice Brown. Jun 65, 39p Rept. no. RM-4577-PR
Contract AF49 638 700

Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Logistics, Replacement theory), (*Tables, Statistical distributions), (*Statistical distributions, Tables), Binomials, Probability, Spare parts, Aircraft.

This Memorandum presents tables giving the values of the individual terms of the negative binomial distribution for 130 pairs of parameter values in Part 1. Part 2, giving the cumulated terms of the same distributions, is in a form directly usable for solving problems which require the determination of probabilities of the occurrence of not more than x events. The negative binomial distributions is described and illustrative examples are given which use this distribution as a tool in the study of demand for replacement parts. The references indicate that the negative binomial has been used in a wide variety of applications to biological research. (Author)

AD-616 730 Div. 15/1, 30/2
CFSTI Prices: HC$1.00 MF$0.50

Naval Missile Center, Point Mugu, Calif.
FORTRAN PROGRAM FOR PLOTTING TWO-DIMENSIONAL GRAPHS,
by R. G. West and J. R. Reynolds. 21 Jun 65, 18p
Technical memo no. NMC-TM-65-31
Task R34UIS003A

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Graphics, Programming(Computers)), (*Programming(Computers), Graphics), (*Programming languages, Graphics).

A computer program in FORTRAN IV language enables users to plot two-dimensional graphs with the standard output printer during the execution phase of any FORTRAN IV or MAP (machine language) main program. This FORTRAN program consists of three subroutines, GRAPH, PACK, and PLACE; and one that is optional, SELECT. Subroutine GRAPH incorporates PACK and PLACE, which are MAP subroutines. These two MAP subroutines conserve computer storage and time required to print the output of the program. Subroutine SELECT is used to define the beginning and end points of the graph scale. If SELECT is not used, the minimum and maximum scale values for the axes must be defined in the main program. The four subroutines are fully described, and the computer listings for them are given. Use of the above subroutines in a main program is demonstrated with a sample main program, called LOOK, as a guide for incorporating the subroutines in any main program. Sample graphs for LOOK are shown as printed by the computer. (Author)

AD-616 742 Div. 15/2
CFSTI Prices: HC$3.00 MF$0.75

Martin Co., Denver, Colo.

ON PRODUCTS AND QUOTIENTS OF RANDOM VARIABLES.
Final rept. for period ending 13 Nov 64,
by Robert S. DeZur and James D. Donahue. Apr 65, 56p
Contract AF33 615 1023, Proj. 7071, Task 707101
ARL 65-71

Unclassified report

Descriptors: (*Stochastic processes, Distribution theory), (*Distribution theory, Stochastic processes), Combinatorial analysis, Numerical analysis, Integration, Statistical functions.

This report, prepared in two parts, deals with products and quotients of random variables. In Part I, the distributions of quotients of independent random variables are considered. In Part II, the distribution of the product of two (not necessarily independent) normally distributed random variates is investigated. The tables of this distribution are given in the Appendix. (Author)

AD-616 760 Div. 15/2, 26/2
CFSTI Prices: HC$2.00 MF$0.50

Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
OBSERVING STOCHASTIC PROCESSES, AND APPROXIMATE TRANSFORM INVERSION.
Management sciences research rept.,
by Donald P. Gaver, Jr. Jun 65, 29p
Rept. no. MSRR-41
Contract Nonr76024, Proj. NR047 048

Unclassified report

Descriptors: (*Stochastic processes, Integral transforms), (*Integral transforms, Stochastic processes), (*Queueing theory, Probability), Operations research, Time.

This paper describes a probabilistic interpretation of the Laplace transform solutions of problems arising in applied probability, e.g., congestion theory. The interpretation is adapted for automatic computation, and is supplemented by an 'extrapolation to the limit' procedure to obtain approximate values for inverse transforms. The approximations are examined for functions with known inverses, and appear satisfactory. The method is applied to study the time-dependent evolution of the expected waiting time at a single-server queue; the results obtained are compared to those derived from asymptotic formulas and exhibit satisfactory agreement. (Author)

AD-616 762 Div. 15/2
CFSTI Prices: HC$1.00 MF$0.50

Research Triangle Inst., Durham, N. C.
ON CROSSINGS OF LEVELS AND CURVES BY A WIDE CLASS OF STOCHASTIC PROCESSES.
Technical rept.,
by M. R. Leadbetter. Jun 65, 21p
Rept. nos. TR-4; SU-181
Contract Nonr456500, Projs. NR042 246, R0 001 01

Unclassified report

Descriptors: (*Stochastic processes, Theory), Distribution theory, Probability, Integral transforms.

In this report definitions are given for crossings, upcrossings and downcrossings of, and tangencies to levels and curves by a process x (t), in a general context. Let C(u) denote the number of crossings of the level u by x (t) in $0 < t < 1$. The mean of C(u) is evaluated for a wide class of stochastic processes and it is shown that tangencies to the level u have probability zero under general conditions. Applications are given to non stationary normal processes, and to the (non normal) envelope of a stationary normal process. (Author)

AD-616 780 Div. 15/1, 30/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING, SYSTEM IDENTIFICATION, AND SUBOPTIMIZATION,
by Richard Bellman. Jun 65, 17p
Rept. no. RM-4593-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Dynamic programming, Functional analysis), (*Pattern recognition, Identification), (*Optimization, Control), Curve fitting.

In this memorandum the author employs the mathematical technique of dynamic programming to obtain a best-fit approximation to a function that is defined over some given interval. He then describes how this method offers an approach to the handling of a certain type of pattern-recognition problem and to the approximation of optimal control policies. (Author)

AD-616 792 Div. 15/1

Institute for Molecular Physics, Univ. of Maryland, College Park.
AN ALGORITHM FOR SUMMING ORTHOGONAL POLYNOMIAL SERIES AND THEIR DERIVATIVES WITH APPLICATIONS TO CURVE-FITTING AND INTERPOLATION,
by Francis J. Smith. 20 Mar 64, 4p
Contract N62558 3634; Grant NsG5 59

Unclassified report

Pub. in Mathematics of Computation v16 n89 p33-6 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Numerical analysis, Series), (*Curve fitting, Numerical analysis), Series, Combinatorial analysis.

This paper describes the application of Clenshaw's technique to the summing of orthogonal polynomial series and extends his principle to the evaluation of any derivative of an orthogonal polynomial series. Applications to least square curve-fitting are discussed and a convenient method is described for interpolating first and higher order derivatives of a function tabulated at equidistant or non-equidistant points.

AD-616 816 Div. 15/1

Syracuse Univ., N. Y.
ON THE NORMAL BUNDLE OF A MANIFOLD,
by Mark Mahowald. 2 Oct 63, 8p
Grant DA ARO D31 124G353
AROD 2653:18

Unclassified report

Pub. in Pacific Journal of Mathematics v14 n4 p1335-41 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Algebraic topology, Theorems), Differential geometry.

AD-616 818 Div. 15/1

Virginia Polytechnic Inst., Blacksburg.
ENUMERATION OF CYCLIC PAIRED-COMPARISON DESIGNS,
by H. A. David. 1963, 9p
Grant DA ARO D31 124G410
AROD 2763:18

Unclassified report

Pub. in American Mathematical Monthly v72 n3 p241-8 Mar 1965
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Combinatorial analysis, Groups-(Mathematics)), (*Groups(Mathematics), Combinatorial analysis), Prime numbers, Game theory.

AD-616 842 Div. 15/2
CFSTI Prices: HC$3.00 MF$0.75

New York State Univ., Buffalo.
SOME PROPERTIES OF DISTRIBUTION FUNCTIONS AND TRANSFORMATIONS THAT INDUCE ONE ANOTHER,
Interim technical rept.,
by Paul J. Schillo and Norman C. Severo. Apr 65, 91p
Contract AF33 657 9885, Proj. 7071, Task 707101
ARL 65-75

Unclassified report

Descriptors: (*Statistical functions, Transformations(Mathematics)), (*Transformations(Mathematics), Stochastic processes), Convex sets, Functional analysis.

This report contains results of research on families of transformations of random variables and families of distribution functions. Each of the families of transformations is such that it induces a fixed distribution function when a given random variable is subjected to any member of the family. Necessary and sufficient conditions are given under which a given family is a non-empty set and in particular it is shown that these depend only on the saltuses of the induced distribution function and of the distribution function corresponding to the random variable being transformed. Each of the families of distribution functions is such that it induces a fixed distribution function when random variables associated with the family are subjected to a fixed transformation. Each family is treated as a convex subset of the function space whose points are Baire functions. Properties of the function space itself are developed in some detail and particular attention is given to questions of the existence of boundary points of the convex subsets. Other related topics are also discussed. (Author)

AD-616 865 Div. 15/1
CFSTI Prices: HC$3.00 MF$0.75

Mathematics Research Center, Univ. of Wisconsin, Madison.
SPECTRAL THEORY FOR THE WAVE EQUATION WITH A POTENTIAL TERM.
Technical summary rept.,
by D. Thoe. Apr 65, 83p Rept. no. MRC-TSR-562
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Partial differential equations, Functional analysis), (*Functional analysis, Partial differential equations), Boundary value problems, Potential theory, Fourier analysis.

AD-616 866 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
REPRESENTATIONS FOR THE GENERALIZED INVERSE OF SUMS OF MATRICES II.
Technical summary rept.,
by Randall E. Cline. Mar 65, 12p
Rept. no. MRC-TSR-559
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Matrix algebra, Theory), Complex variables.

A representation is obtained for the generalized inverse of any matrix sum U + V. Various special cases are considered. (Author)

AD-616 867 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON COMPLEMENTARY VARIATIONAL PRINCIPLES.
Technical summary rept.,
by L. B. Rall. May 65, 20p Rept. no. MRC-TSR-558
Contract DA11 022 ORD2059

Unclassified report

Descriptors: (*Functional analysis, Calculus of variations), (*Calculus of variations, Functional analysis), Operators(Mathematics).

Variational problems which are formulated in terms of finding maxima or minima of functionals usually lead to only one-sided bounds for approximate solutions. It has been shown recently by B. Noble that a number of variational problems may be formulated in terms of complementary variational problems, the approximate solutions of which give both upper and lower bounds for the desired stationary value. In this paper, complementary variational principles are formulated abstractly in Hilbert space. Necessary and sufficient conditions are given for a system of two equations to represent a variational principle, and sufficient conditions are given for the variational principle to be complementary. (Author)

AD-616 868 Div. 15/1, 25/5
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
OBSERVABLES AND DERIVABLES. PART I: SPECIAL TYPES.
Technical summary rept.,
by Stanley P. Gudder. May 65, 21p
Rept. no. MRC-TSR-560
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Functional analysis, Quantum mechanics), (*Quantum mechanics, Functional analysis), Probability, Mapping(Transformations), Operators(Mathematics).

This paper is concerned with special types of observables and derivables and the relationships between them. In particular, we consider special types of derivables classified according to their spectra and then characterize these derivables in ways which are independent of this spectra. Derivables with countable spectra are considered; compact

derivables are treated; bounded derivables are considered; and derivables with positive spectra and spectra with unit modulus are discussed. Uniqueness and existence properties of bounded observables are discussed. (Author)

AD-616 869 Div. 15/1, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
THE INITIAL-BOUNDARY VALUE PROBLEM FOR A NON-LINEAR HYPERBOLIC EQUATION IN RELATIVISTIC QUANTUM MECHANICS.
Technical summary rept.,
by Jerome Sather. Mar 65, 41p
Rept. no. MRC-TSR-550
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Boundary value problems, Partial differential equations), (*Quantum mechanics, Boundary value problems), Relativity theory, Functional analysis.

AD-616 870 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
MULTISTEP METHODS FOR THE NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS MADE SELF-STARTING.
Technical summary rept.,
by Diran Sarafyan. May 65, 16p
Rept. no. MRC-TSR-495
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Numerical methods + procedures, Differential equations), (*Differential equations, Numerical methods + procedures), Taylor's series, Theory.

Milne's method and other similar multistep ones for the approximate solution of differential equations, are not self-starting. They require the use of known p pivotal points (x sub i, y(x sub i)), i = 0,1, ... , (p-1), where x's are equally spaced and y = y(x) is the solution of the differential equation. Usually these pivotal points are generated through the use of a set of so-called p-point formulas, preferably p being an odd integer. But these p-point formulas are not self-starting either. A rational method is established herein which will make these p-point formulas, and consequently also the multistep methods, self-starting. Subsequently the method is extended to systems of differential equations. (Author)

AD-616 871 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON POLYA FREQUENCY FUNCTIONS IV: THE FUNDAMENTAL SPLINE FUNCTIONS AND THEIR LIMITS.
Technical summary rept.,
by H. B. Curry and I. J. Schoenberg. Jun 65, 48p
Rept. no. MRC-TSR-567
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Functions, Theory), Statistical functions, Geometry, Topology, Numerical analysis.

The theory of spline functions is developed to a point which allows us to establish the properties of spline interpolation for the case of multiple nodes. The genesis of Polya frequency functions from spline functions is developed. (Author)

AD-616 872 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
E-TRANSFORMS.
Technical summary rept.,
by F. M. Ragab. Apr 65, 23p Rept. no. MRC-TSR-563
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Integral transforms, Special functions-(Mathematical)), Bessel functions, Theory.

A new class of integral transform is established. Special choices of the parameters in this transform lead in turn to the derivation of Hankel transform, Y-transform, K-transform, Fourier transform, Laplace transform and other new integral transforms which are illustrated by tables. (Author)

AD-616 873 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
PERTURBATION OF ORDINARY DIFFERENTIAL OPERATORS.
Technical summary rept.,
by Robert E. L. Turner. Apr 65, 18p
Rept. no. MRC-TSR-561
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Perturbation theory, Operators-(Mathematics)), (*Operators(Mathematics), Perturbation theory), Boundary value problems, Functional analysis.

A perturbation theorem is proved which enables us to extend the results of J. Schwarts and others, to the effect that a wide class of boundary value problems for ordinary differential operators with operator valued coefficients generate unbounded spectral operators in the L(2) space over a finite interval. (Author)

AD-616 874 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ASYMPTOTIC SOLUTIONS OF SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS.
Technical summary rept.,
by W. A. Coppel. Mar 65, 18p Rept. no. MRC-TSR-555
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Differential equations, Theory), Integration, Transformations(Mathematics), Functions.

AD-616 875 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
CLASSIFICATION AND REDUCTION OF SECOND ORDER SYSTEMS AT A TURNING POINT.

Technical summary rept.,
by R. J. Hanson and D. L. Russell. Mar 65, 40p
Rept. no. MRC-TSR-557
Contract DA11 0220RD2059

Unclassified report

Descriptors: (*Differential equations, Theory), Matrix algebra, Complex variables, Series, Transformations-(Mathematics).

This report classifies and simplifies turning point problems arising from second order systems of ordinary differential equations involving a small parameter. (Author)

AD-616 921 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

Boeing Scientific Research Labs., Washington, D. C.
CONVEX PROGRAMMING AND OPTIMAL CONTROLS.
Mathematical note,
by A. A. Goldstein. Apr 65, 11p
Rept. nos. D1-82-0430, MN-406

Unclassified report

Also available from the author.

Descriptors: (*Optimization, Control), (*Nonlinear programming, Control), Fuel consumption, Control systems, Linear programming, Operations research.

The use of convex programming to attack problems of optimal control is not new, but it is becoming of increasing interest. Techniques of steepest descent and gradient projection have been used by Balakrishnan, Goldstein, Neustadt and Neustadt-Paiewonsky. For the case of unbounded fuel-optimal linear controls Neustadt, has shown that the problem may be cast into the form of an infinite linear program. More recently, Dantzig and Van Slyke have obtained results in this direction for bounded linear controls. This paper is concerned with the case of fuel-optimal linear controls. This problem is reduced to the case of minimizing a convex function on E sub n and techniques of infinite convex programming are applied. In the important case when the thrust magnitude is constrained, the convex function is continuously differentiable, and techniques of steepest descent may be applied. This approach has already been suggested by Neustadt-Paiewonsky. (Author)

AD-616 922 Div. 15/1
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
TWO-POINT BOUNDARY VALUE PROBLEMS OF FOURTH ORDER WITH POSITIVE GREEN'S FUNCTIONS.
Mathematical note,
by Johann Schroder. Feb 65, 28p Rept. nos. D1-82-0412, MN-393

Unclassified report

Also available from the author.

Descriptors: (*Boundary value problems, Green's function), (*Green's function, Boundary value problems), Theorems, Operators(Mathematics), Beams(Structural), Elasticity.

There are derived sufficient conditions for the positivity of Green's function of two-point boundary value problems of the fourth order. The results are gained by applying a theorem on inverse-monotonic operators in partially ordered spaces. In the case of an example (beam on elastic support), the derived conditions are also necessary. (Author)

AD-616 997 Div. 15/2, 12/3
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE APPLICATION OF STOCHASTIC PROCESSES TO COUNTDOWN ANALYSIS,
by David S. Stoller. May 65, 18p
Rept. no. P-3148

Unclassified report

Prepared for presentation to the NATO Conference on Operations Research, Lisbon, Portugal, 27 September-1 October, 1965.

Descriptors: (*Stochastic processes, Checkout procedures), (*Checkout procedures, Stochastic processes), Operations research.

AD-617 000 Div. 15/1, 9/1
CFSTI Prices: HC$1.00 MF$0.50

Reed Research, Inc., Washington, D. C.
THE SPHERE THEOREM IN POTENTIAL THEORY,
by J. Martinek, G. C. K. Yeh, and G. S. S. Ludford.
1953, 8p
Contract Nonr144500

Unclassified report

Prepared in cooperation with Maryland Univ., College Park.

Descriptors: (*Potential theory, Spheres), (*Spheres, Potential theory), Harmonic analysis, Hydrodynamic configurations, Integrals.

A sphere theorem similar to that of Weiss is proved, and examples of its application given.

AD-617 001 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON A CLASS OF NONLINEAR DIFFERENTIAL EQUATIONS WITH NONUNIQUE SOLUTIONS,
by Richard Bellman. Jun 65, 3p
Rept. no. P-3147

Unclassified report

Descriptors: (*Nonlinear differential equations, Theory), Boundary value problems, Transcendental functions.

A class of nonlinear differential equations is described subject to conditions analogous but not equivalent to multipoint conditions which can possess an infinite number of solutions. These equations are suggested by some work in respiratory control theory which will be described elsewhere.

AD-617 079 Div. 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON BALANCED SETS AND CORES,
by Lloyd S. Shapley. Jun 65, 21p
Memo. no. RM-4601-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Set theory, Game theory), (*Game theory, Set theory), Matrix algebra, Special functions(Mathematical).

A direct correspondence is established between the balanced sets of coalitions of a multi-person game and the conditions that determine whether the game has a core. A balanced set is a collection of subsets of a finite set that can be so weighted as to cover the whole set uniformly. The core of a game is the set of outcomes that cannot be blocked by any coalition. (Author)

AD-617 082 Div. 15/2
CFSTI Prices: HC$2.00 MF$0.50

Dunlap and Associates, Inc., Darien, Conn.
TWO EXTENSIONS OF STATISTICAL DECISION THEORY.
Final rept.,
by U. O. Gagliardi. Jan 65, 36p
Contract AF19 628 4303, Proj. 4690
ESD TDR-65-216

Unclassified report

Descriptors: (*Decision theory, Mathematical models), (*Statistical analysis, Decision theory), Operations research, Computers, Programming(Computers), Decision making.

The objective of the project was to develop broader formulations of the mathematical (statistical) theory of decisions. This final report presents two broad scope generalizations which have resulted from the project. The first generalization discussed is a decision-making model which applies to the case of a not-well-informed decision maker with independent data sources. In this model, the inference about the prior distribution is determined from the solution of an adjunct decision problem, which specifies the minimum risk hypothesis in the light of the available information. The second generalization presented is a model of multi-period decision making for both stationary and Markovian environments. In contrast to the model discussed in the above paragraph, this model does not assume independent data sources, i.e., that the observation processes are not affected by the actions of the decision maker. (Author)

AD-617 096 Div. 15/2
CFSTI Prices: HC$2.00 MF$0.50

Boeing Scientific Research Labs., Seattle, Wash.
TESTS FOR MONOTONE FAILURE RATE.
Mathematical note,
by Fr..nk Proschan and Ronald Pyke. Mar 65, 47p
Rept. no. MN-400, D1-82-0422

Unclassified report

Also available from the authors.

Descriptors: (*Statistical tests, Failure(Mechanics)), (*Failure(Mechanics), Statistical tests), Reliability, Statistical distributions, Operations research.

Physical considerations often lead one to expect that a distribution has increasing failure rate, and knowledge of increasing failure rate is mathematically useful in solving a variety of practical problems. In this paper, a non-parametric test to determine whether a sample comes from a population possessing an increasing failure rate is proposed and investigated. The test statistic is based only on the ordering of normalized spacings between the ordered observations. The distribution of the test statistic under the null hypothesis of constant failure rate is known. Suitably normalized, it is shown to be asymptotically normally distributed for a wide class of alternatives. In particular, under mild assumptions, when the underlying distribution has increasing failure rate, the test statistic is asymptotically normally distributed. The test is shown to be unbiased. The criterion of asymptotic relative efficiency is used to compare the test proposed with the likelihood ratio test for Weibull alternatives and with the likelihood ratio test for Gamma alternatives. (Author)

AD-617 188 Div. 15/1
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
LIMIT THEOREMS INVOLVING CAPACITIES,
by Sidney C. Port. Jun 65, 58p Memo. no. RM-4561-PR
Contract AF49 638 700

Unclassified report

Continuation of Memo. no. 3995.

Descriptors: (*Probability, Set theory), (*Set theory, Probability), Measure theory, Potential theory, Invariance, Matrix algebra, Numerical methods + procedures.

The asymptotic behavior of P Sub X(T sub B > n), P Sub X(n < V sub B < infinity) and several related quantities in a denumerable state space transient Markov chain are investigated. Here T Sub B, V sub B are respectively the time of last and first visit to the finite nonempty set B. Applications are given to several specific Markov chains. (Author)

AD-617 208 Div. 15/1

Syracuse Univ., N. Y.
SOME GEOMETRIC ASPECTS OF FUNCTIONS OF HARDY CLASS Hp,
by G. T. Cargo. 1962, 4p
Contract AF49 638 571
AFOSR 65-0866

Unclassified report

Pub. in Journal of Mathematical Analysis and Applications v7 n3 p471-74 Dec 1963(Copies available only to DDC users).

Descriptors: (*Functions, Geometry), (*Set theory, Functions), Trigonometry, Functional analysis, Inequalities.

13. Mechanical, Industrial, Civil, and Marine Engineering

AD-616 506 Div. 26/2, 23/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
DECISION-MAKING IN THE SCHOOLS: AN OUTSIDER'S VIEW,
by Joseph A. Kershaw and Roland N. McKean.
19 Jan 60, 15p Rept. no. P-1886-FF
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Decision making, Education), (*Education, Management planning), (*Management planning, Education), Budgets, Management engineering, Personnel management, Students, Learning, Optimization.

One method of approaching decision making is discussed. A numerical example is given which illustrates this approach to decision-making and also shows how more nearly scientific comparisons of school policies can perhaps be made.

AD-616 522 Div. 11/5
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
POLAR TRANSPORTATION EQUIPMENT; LIGHT-WEIGHT, 3/4-TON-UNIT CARGO SLED.
Rept. for Sep 61-Mar 65,
by N. E. Pierce and G. E. Sherwood. Jun 65, 18p
Technical rept. no. R-392
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Sleds, Cargo vehicles), (*Polar regions, Cargo vehicles), Towed vehicles, Transportation, Handling, Maneuverability, Design, Couplings, Weight, Aluminum, Tracked vehicles, Tractors, Passenger vehicles, Terrain.

Certain cargo-hauling operations in polar regions require small, lightweight sleds which can be manhandled and can be coupled together for use behind lightweight tracked and wheeled vehicles. Most light-duty cargo sleds are too heavy for easy manhandling, and their coupling methods are not adequate. Even when couplers are provided, it is usually difficult to connect sleds on uneven terrain, and the coupled sleds cannot be backed without buckling. The report presents the development of a 3/4-ton-capacity cargo-sled unit of aluminum construction, which can be coupled together in multiples of up to 6 units for towing by size 1 and 2 snow tractors and in fewer numbers for towing by tracked and wheeled personnel vehicles. The coupling system is suitable for connecting the units on uneven terrain and for backing coupled sleds.

AD-616 526 Div. 13/4, 17/5
CFSTI Prices: HC$2.00 MF$0.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
TANGENTIAL STRESS EXPERIMENTS ON CORRUGATED STEEL PANELS (Schubknickversuche mit Wellblechtafeln),
by Edgar Seydel. Jun 65, 38p T-1787-65
Contract DA44 009AMC930T, Proj. 1M643324D317
TT 65-62491
Unclassified report

Trans. of Deutsche Versuchanstalt fuer Luftfahrt, e. V. Jahrbuch (Germany) p233-45 1931.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Panels(Structural), Steel), (*Loading-(Mechanics), Panels(Structural)), (*Stresses, Panels-(Structural)), Buckling(Mechanics), Sheets, Airplane panels, Mathematical analysis.

Experiments on tangential stress in corrugated steel sheets were made to determine the buckling deformation and safe loading of the sheets. The experimental findings were compared with the theoretical buckling stress, which results in an orthogonal-anisotropic sheet corresponding to the corrugated steel sheet. (Author)

AD-616 540 Div. 26/2, 26/3, 14/2
CFSTI Prices: HC$4.00 MF$0.75

Institute for Cooperative Research, Univ. of Pennsylvania, Philadelphia.
A PRODUCTION SMOOTHING PROBLEM IN THE GLASS CONTAINER INDUSTRY.
Master's thesis,
by Frank J. Carmone, Jr. 1964, 113p
Unclassified report

Descriptors: (*Management engineering, Industrial production), (*Industries, Glass), Containers, Inventory analysis, Optimization, Decision making, Costs.

AD-616 541 Div. 26/2
CFSTI Prices: HC$5.00 MF$1.25

Institute for Cooperative Research, Univ. of Pennsylvania, Philadelphia.
A GENERALIZATION OF PROGRAM EVALUATION AND REVIEW TECHNIQUE/CRITICAL PATH METHOD.
Master's thesis,
by Jerome J. Day, Jr. 1964, 185p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Management engineering, Linear programming), (*Linear programming, Management engineering), Mathematical models.

AD-616 623 Div. 13/11, 18/1
CFSTI Prices: HC$4.00 MF$1.00

Gage, Babcock and Associates, Inc., Chicago, Ill.
A SYSTEM FOR LOCAL ASSESSMENT OF THE CONFLAGRATION POTENTIAL OF URBAN AREAS.
Final rept.,
by B. M. Cohn, L. E. Almgren, and M. Curless. Mar 65, 150p
Contract OCD PS64 74, Task 2538A
Unclassified report

Descriptors: (*Fires, Urban areas), (*Urban areas,

Fires), (*Fire safety, Civil defense systems), Damage, Disasters, Vulnerability, Classification, Thermal radiation, Wind, Buildings, Construction, Hazards.

An empirical system was developed for local application to permit both the assessment of relative conflagration potential (by assigning ratings to urban blocks indicating their relative susceptibility to mass fire) and the delineation of firebreaks to isolate or divide conflagration areas. The basis of the system was the application of fire protection engineering principles to evolve formulae and relative ratings for the factors involved in fire spread. Results consistent with the observations of experienced fire department officers were achieved when assigning numerical ratings to predominant factors; then applying a generalized formula for computing block ratings to indicate relative conflagration hazard. However, to obtain actual exposure distances required individual analysis of structures along the potential firebreak. As a result, two analytic methods were prepared, and simplified versions of each were devised. The regular and simplified methods were field tested by civil defense and fire department volumteers to insure ease of application, conformity to existing knowledge of fire spread, and consistency of results. The final versions are considered valid for the purposes set forth. (Author)

AD-616 634 Div. 31/5
CFSTI Prices: HC$1.00 MF$0.50

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
MODEL TESTS OF A ROUND-BOTTOM PATROL BOAT IN SMOOTH AND ROUGH WATER.
Letter rept.,
by Gerard Fridsma. Jun 65, 20p Rept. no. LR-1074
Contract N600 167 61303x, Proj. 2993 236
Unclassified report

Descriptors: (*Patrol craft, Model tests), (*Model tests, Patrol craft), (*Boats, Model tests), Fluid dynamic properties, Performance(Engineering), Hydrodynamic configurations, Water waves, Center of gravity, Hulls(Marine), Design, Acceleration.

Performance characteristics in smooth and rough water are presented for a round bottom patrol boat, based on tests conducted on a 1/16 model (No. 5016). Comparison is made with another model of smaller length/beam ratio (model No. 4927). Model 5016 exhibited good resistance and EHP (effective horsepower) characteristics in smooth water up to a ship speed of 30 kts when compared with the 6 previously tested models of R-985. (AD-605 309) In rough water, the resistance in Sea States 3 and 5 is at least comparable if not better than these models. Motions and accelerations of the present model in a Sea State 3 were superior in all instances. In Sea State 5, it is still impractical to operate this boat much beyond 25 or 30 kts. In this range, the motions and accelerations of the present model are at least comparable to the other round bottom hulls, but not as good as the hard chine forms.

AD-616 638 Div. 13/11, 18/1
CFSTI Prices: HC$3.00 MF$0.75

Stanford Research Inst., Menlo Park, Calif.
EXPLORATORY ANALYSIS OF FIRE STORMS.
Final technical rept.,
by Robert M. Rodden, Floyd I. John, and Richard Laurino.
May 65, 69p
Contract N228 62479 65419, Proj. 5070, Task 2536D
Unclassified report

Descriptors: (*Fires, Nuclear explosion damage), (*Urban areas, Fires), (*Fire safety, Civil defense systems), Ignition, Thermal radiation, Flammability, Flame propagation, Nuclear warfare casualties, Buildings, Wind, Terrain, Atmospheric temperature, Atmospheric precipitation, Humidity.

The study is an evaluative review of existing knowledge and opinion relating to fire storm phenomenology. It develops interim critical values of fire storm parameters that may be used in target analyses to establish conditions for possible occurrence of fire storms. The basic factors in initiation and development of fire storms are identified and are organized into a format to serve as the framework for a fire storm model. The casualties resulting from fire storms are discussed, and a possible method for predicting fire entrapment areas is presented. It is concluded in the investigation that major parameters and constraints affecting the initiation and development of fire storms include fuel loading, initial fire density, size of the initial fire area, surface wind, and topography and configuration. Factors which in general appear to determine the extent and nature of fire storms, as opposed to their possible existence, include combustibility, fire intensity buildup rate, atmospheric stability, temperature, humidity, and precipitation. Recommendations are given for further investigations to improve the state of knowledge in those areas where valid information is lacking. (Author)

AD-616 669 Div. 26/3, 26/2, 30/2

RAND Corp., Santa Monica, Calif.
A HEURISTIC PROGRAM FOR ASSEMBLY LINE BALANCING,
by Fred M. Tonge. 18 May 60, 157p
Rept. no. P-1993
Unclassified report

Available only for reference use at DDC Field Services Copy is available from CFSTI HC $5.00 MF $1.00 as PB-166 430 (not fully legible).

Descriptors: (*Scheduling, Industrial production), (*Management engineering, Scheduling), (*Industrial production, Scheduling), Industries, Machine shop practice, Operations research, Combinatorial analysis, Digital computers, Programming(Computers).

By assembly line balancing is meant the process of assigning jobs to workers stationed along a continuous assembly line. The work of Newell, Shaw, and Simon on heuristic problem-solving, although oriented toward human cognitive process rather than industrial decisions, suggests both an approach to combinatorial problems using heuristic procedures and a method of employing electronic computers to carry out these procedures. The research reported here aims to extend these techniques to the solution of the assembly line balancing problem. The goals are: (1) to develop an acceptable, though not necessarily optimum, procedure for assembly line balancing. (2) to gain some understanding of the use of computers for implementing heuristic decision procedures in the industrial management area.

AD-616 705 Div. 13/4
CFSTI Prices: HC$5.00 MF$1.00

Naval Missile Center, Point Mugu, Calif.
THE DYNAMIC FLEXURAL RESPONSE OF SYNTHESIZED INFINITE BEAMS.
Doctoral thesis,
by M. A. Garcia. May 64, 151p
Misc. Pub. no. MP-65-7
Unclassified report

Descriptors: (*Beams(Structural), Dynamics),

Mechanical properties, Deformation, Shear stresses, Integral equations, Elasticity, Mathematical analysis, Stresses.

Primarily, this is an investigation into the physical occurrences associated with the transverse, or flexural, dynamic response of a beam as described by the macroscopic theories. The primary purpose is not to solve problems of practical interest, although it is indicated how the data presented are used for this end, but to treat in detail some of the fundamental physics involved in the flexural response of beams. Towards this goal, the beam is synthesized in a manner that emphasizes certain phenomena associated with the dynamic bending of beams. Consequently, the beam is artificial in the sense that a continuous system is approximated by a model which collects certain characteristics of the system into discrete elements, i.e., chords (tension-compression members) connected by massless shear webs, and which also neglects the elasticity of the real system in the vertical direction.

AD-616 712 Div. 33/2

Oklahoma Univ., Norman.
OPERATIONS ANALYSIS IN URBAN TRANSPORTATION GENERATES EXPRESS TRANSIT TO COPE WITH TRAFFIC CONGESTION.
Master's thesis,
by James Gordon Wyatt. 1965, 100p
Contract AF33 608 1096
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Traffic, Urban areas), (*Urban areas, Traffic), (*Transportation, Urban areas), Passenger vehicles, Cargo vehicles, Roads, Control systems, Management planning, Urban planning, Mathematical models.

The purpose of the thesis is to examine alternative methods of evaluating the utilization of mass transportation. Several mathematical models employed by operations research are presented and demonstrated for use in planning expanded transit facilities. It is hoped that the study will contribute toward solving problems of traffic congestion.

AD-616 723 Div. 13/4
CFSTI Prices: HC$2.00 MF$0.50

Oklahoma State Univ., Stillwater.
DETERMINATION OF SUSPENDED ROOF SHAPES USING ELECTRICAL ANALOG METHODS.
Master's thesis,
by David Gene K[illegible]ngenberger. May 65, 46p
Contract AF33 608 1097
Unclassified report

Descriptors: (*Roofs, Geometric forms), Determination, Construction, Buildings, Supports, Cables(Mechanical), Mathematical analysis, Analog systems, Structures.

Mathematical relationships are developed which govern analogies between prototype and electrically simulated roof system geometry. Applications of the analog method are demonstrated.

AD-616 724 Div. 13/4
CFSTI Prices: HC$3.00 MF$0.75

Oklahoma State Univ., Stillwater.
MICROCONCRETE MODEL CONSTRUCTION OF A PRESTRESSED SUSPENDED ROOF.
Master's thesis,
by Arthur Peter Hahn. 1957, 63p
Contract AF33 608 1097
Unclassified report

Descriptors: (*Roofs, Reinforced concrete), (*Models(Simulation), Roofs), (*Reinformced concrete, Roofs), Cables(Mechanical), Structures, Mathematical analysis, Loading(Mechanics), Aging (Materials), Construction.

Construction of the microconcrete model revealed that small diameter aircraft cable and microconcrete are excellent model materials. Extensive preliminary material testing must precede the actual construction if satisfactory results are to be achieved. Much forethought must also be given to the design of the model frame so buckling will not occur when heavy loads are applied. Movement of the frame must particularly be avoided in models of suspended roofs because small horizontal movement of the frame results in large vertical deflection of the roof cables. A circular plan form is, therefore, more desirable than a rectangular plan. Weighting of a suspended roof requires a great quantity of material and unless space is reserved under the formwork, the construction of the model is considerably complicated. (Author)

AD-616 751 Div. 26/4
CFSTI Prices: HC$2.00 MF$0.50

Rutgers - The State Univ., New Brunswick, N. J.
Statistics Center.
CHAIN SAMPLING INSPECTION PLANS-ChSP-0,2 AND ChSP-1,2,
by Kenneth S. Stephens and Harold F. Dodge.
May 65, 45p Technical rept. no. N-21
Contract Nonr40418, Projs. NR042 241, RR003 05 01
Unclassified report

See also AD-610 041.

Descriptors: (*Quality control, Statistical analysis), (*Statistical analysis, Quality control), (*Sampling, Quality control), Stochastic processes, Matrix algebra, Operations research.

This report develops the theory for and evaluates statistical properties of additional 'two-stage' chain sampling inspection plans, plans with pairs of acceptance numbers of 0,2 and 1,2. An earlier report covered plans with acceptance numbers of 0,1. Included is a matrix procedure for determining the limiting probability distribution of Markov Chains used in determining the operating characteristics of chain sampling plans. (Author)

AD-616 886 Div. 31/5, 14/7, 17/2
CFSTI Prices: HC$2.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
PROTECTION OF MOORING BUOYS. PART VI. RESULTS OF FIFTH RATING INSPECTION.
Technical rept. for Oct 64-Feb 65,
by R. W. Drisko. Jun 65, 47p Rept. no. R-385
Proj. Y R007 08 04 404
Unclassified report

See also AD-611 410.

Descriptors: (*Mooring buoys, Protective treatments), (*Protective treatments, Mooring buoys), (*Corrosion inhibition, Mooring buoys), Steel, Fouling, Coatings,

Antifouling coatings, Degradation, Cathodic protection, Cathodes(Electrolytic cell), Zinc, San Diego Bay, Epoxy plastics, Phenolic plastics, Polyester plastics, Vinyl plastics, Zinc compounds, Silicates.

Fourteen test buoys were given their fifth rating for extent of coating deterioration, corrosion of steel, and fouling. A fifteenth buoy had been removed from testing at the time of the fourth inspection because of advanced deterioration. The coating systems on four of the buoys were in good condition, and those on the ten others showed varying degrees of moderate deterioration. Two sets of thirteen test panels each, coated with the different coating systems used on the buoys, were given their fourth rating inspection after 2 years of service. One set was exposed in San Diego Bay and the other in Port Hueneme Harbor. The condition of the coating systems on the Port Hueneme panels showed a general correlation with the test panels and buoys in San Diego. On those buoys with antifouling paints, no detectable antifouling protection remained after 25 months, but on the test panels at both locations two antifouling paints were still retarding fouling after 2 years. Three of the test buoys were cathodically protected with zinc anodes. The level of protection was great enough to mitigate rusting on the underwater portions of these buoys. (Author)

AD-616 891 Div. 31/3
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
THE DTMB MARK 1 CABLE-FAIRING RESTRAINER,
by Arthur P. Brisbane. May 65, 26p
Rept. no. 2009
Proj. SF001 03 20, Task 8058
Unclassified report

Descriptors: (*Cable fairings, Suspension devices), (*Suspension devices, Cable fairings), (*Towing cables, Cable fairings), Underwater equipment, Rings, Design, Tests.

The DTMB Mark 1 Cable-Fairing Restrainer was developed for cable-towed-body systems that use TMB T-3 (modified no. 7) rubber cable fairing and 1.34-inch-diameter towcable. This restrainer was designed to eliminate breaking, bunching, and kiting of the towline by preventing axial movement of the fairing relative to the cable but permitting the fairing to swivel about the cable. It consists of two basic parts; a yoke attached to the fairing and a mechanical compression ring attached to the cable. In developing the Mark 1, both bonded and mechanical compression restrainers were investigated. The bonded restrainers lacked durability in water and under repeated crushing loads. Of the mechanical compression types, the Mark 1 restrainer satisfied most of the design requirements. (Author)

AD-616 907 Div. 13/4, 15/1
CFSTI Prices: HC$5.00 MF$1.00

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
MATRIX ANALYSIS OF SHELL STRUCTURES,
by Stanley Klein. Jun 64, 174p
ASRL-TR-121-12
Contract AF04 694 427
Unclassified report

Descriptors: (*Structural shells, Matrix algebra), (Matrix algebra, Structural shells), Bodies of revolution, Power series, Fourier analysis, Harmonic analysis, Vibration.

The methods of matrix structural analysis are applied to the solution of an arbitrary shell structure composed of shells of revolution under both symmetric and asymmetric loads. The Displacement Method is employed by assuming a power series displacement pattern along the meridian of a finite conical element. This plus a Fourier expansion in the circumferential angle results in an element stiffness matrix for the general kth harmonic. Improvement of the element stiffness matrix using the Principle of Minimum Potential Energy is explored in detail. Comparisons with recent work in this area and with other methods of solution are presented. Numerical results for element matrices and for structural analyses are obtained for the symmetric situation, using an IBM 7094. These results indicate that the comparatively simple finite element displacement approach provides an effective method of handling the complicated shell problem. The displacement assumption employed in the static analysis is used to derive an element mass matrix, and a solution for the vibrations of shell structures composed of shells of revolution is given. (Author)

AD-616 908 Div. 26/1, 8/2
CFSTI Prices: HC$1.00 MF$0.50

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING PROCESS AND EQUIPMENT FOR CONSTRUCTION OF ELECTRON-TUBE MOUNTS.
Quarterly progress rept. no. 11, 1 Jan-31 Mar 65,
by J. G. Thomas. 31 Mar 65, 18p
Contract DA36 039sc86741
Unclassified report

See also AD-614 450.

Descriptors: (*Welding, Ultrasonic radiation), (*Electron tubes, Welding), (*Ultrasonic radiation, Welding), Electron tube parts, Tungsten alloys, Rhenium alloys, Welding rods, Small tools, Welds.

Fabrication of redesigned tooling for use with the 600-watt welder was completed. Satisfactory performance was established during the fabrication of 36 sub-assemblies, and a complete 6080WB electron-tube mount was obtained using the new tooling and a modified assembly sequence. The welder with tooling was then redelivered to Tung-Sol, and operator training was initiated. Also, a precision fixture for crimping stem leads was designed and fabricated. Components welding has been delayed by the effort required for the redesign of tooling. However, design studies of a 600-watt welder with special low clamping forces for welding frame grids have been initiated. (Author)

AD-616 984 Div. 13/4
CFSTI Prices: HC$1.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
PIONEER POLAR STRUCTURES, JAMESWAY PICTURE WINDOW.
Technical rept.,
by G. E. Sherwood. May 65, 16p Rept. no. TR-384
Proj. Y F015 11 01 105
Unclassified report

Descriptors: (*Polar regions, Structures), Shelters, Plywood, Wood, Glass, Military facilities, Materials, Specifications, Civil engineering.

A picture window was developed for use in the side of a Jamesway polar shelter. It is placed in a dormer of plywood and wood framing that fits between two Jamesway arch ribs. Windows can be placed side by side in any quantity to provide the desired width. Double plate glass is used in the standard window, but a hermetically sealed, triple-glass unit can be used as

an alternate. Two prototype picture windows were in-service tested at the NCEL experimental camp near McMurdo, Antarctica. One window was used in the office; the other was used in the mess hall. It was concluded that the picture window satisfies the requirements for a window in the side of a Jamesway and should be used as a standard accessory for the Jamesway. (Author)

AD-617 007 Div. 26/1, 8/2
CFSTI Prices: HC$2.00 MF$0.50

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
ELECTRON BEAM TECHNIQUES FOR FABRICATION AND ASSEMBLY OF PARTS FOR ELECTRON TUBES.
Quarterly rept. no. 6, 1 Oct-31 Dec 64,
by J. F. Dudenhoefer. 31 Dec 64, 29p
Rept. no. EBR-159
Contract DA36 039AMC03625E
Unclassified report

See also AD-612 116.

Descriptors: (*Electron tube parts, Manufacturing methods), (*Machining, Electron beams), (*Welding, Electron beams), (*Electron beams, Manufacturing methods), Electron tubes, Life expectancy.

It is feasible and practical to fabricate type 6544 tubes which comply with existing governing specifications by using the electron beam welding techniques established in this program. Utilizing the electron beam welding techniques established in this program, it is possible to fabricate type 6544 tubes which have a functional life in excess of 1000 hours. Manufacturing problems not associated with the electron beam process have prevented fabrication of acceptable 6914A preproduction sample tubes during this reporting period. (Author)

AD-617 084 Div. 13/6
CFSTI Prices: HC$6.00 MF$1.25

Kansas State Univ., Manhattan.
AN ANALYSIS OF AIR FORCE MASTER PLANNING AND THE EFFECT OF SPACE PROGRAMS ON LAND DEVELOPMENT.
Master's thesis,
by Joe B. Hollingsworth. 1965, 229p
Contract AF33 608 1076
Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Military facilities, Air force operations), (*Air force operations, Military facilities), (*Urban planning, Military facilities), Ranges(Establishments), Spacecraft, Launching, Transportation, Guided missile ranges.

Summary: The United States Air Force has a mission in space. This mission is to conduct operations in space for the advancement of men's knowledge and capabilities. Therefore, future missions of many Air Force bases will require the consideration of space support facilities. City planning as a profession is developing rapidly. The 'state of the art' as practiced in the civilian community is more advanced than as practiced by the Air Force. The techniques, procedures, and standards used by the city planning profession in developing civilian master plans can be of assistance to Air Force master planning. They are required tools for successful development. Land use standards, in particular, are needed to permit personnel responsible for Air Force planning to check existing facilities for adequacy and to allow computation of total land requirements for new bases and facilities. The air Force lacks trained professional planners. To overcome this shortage, there is a need for an adequate Air Force manual on master planning encompassing the latest techniques, procedures and standards. They must be prepared with the thought in mind that most persons using them for the development of an Air Force base master plan are not formally educated city planners. (Author)

AD-617 089 Div. 31/5
CFSTI Prices: HC$1.00 MF$0.50

Holman (John F.) Co., Inc., Washington, D. C.
THE EFFECT OF THE SHAPE OF THE WATER-FLOW SYSTEM ON THE CALCULATION OF POWER PARAMETERS,
by I. M. Chornyi. Jul 65, 22p
Contract DA44 009AMC930T
AERDL T-1792-65;TT 65-62525
Unclassified report

Pro Vpliv Formi Protochnoi Chastini Vodometa na Rozrakhunkovi Parametri Ruchiinogo Kompleksu. Trans. of Akademiya Nauk URSR, Kiev. Instytut Hidrologii i Hydrotekhniky. Visti, v22 p68-80 1963.

Descriptors: (*Fireboats, Marine surface propulsion), (*Fire pumps, Power), (*Hydroduct engines, Configuration), Propellers(Marine), USSR, Model tests, Numerical analysis, Performance(Engineering).

Modern methods of designing water-pressure engines incorporate the characteristics of axial flow pumps or performance curves of insulated propellers. The disadvantage of these methods is the lack of reliable data on the interaction between the engine and the hull of the fireboat, which are determined experimentally. This article cites data characterizing the interaction between the engine and the hull obtained in tests with a large-scale model of a double-shaft fireboat with different shapes of the suction duct. It has been shown that this form has a substantial effect on the propulsive capacity of the power complex. The basic experimental relations are presented in dimensionless magnitudes in the form of diagrams that can be used in planning and designing water-pressure engines by the 'equivalent propeller' method. (Author)

AD-617 092 Div. 26/1
CFSTI Prices: HC$3.00 MF$0.75

Foreign Technology Div., Wright-Patterson AFB, Ohio.
FLUXES FOR MECHANIZED ELECTRIC WELDING,
by V. V. Pidhaietskyi. 2 Apr 65, 92p
FTD-TT-64-1252
TT 65-62528
Unclassified report

Unedited rough draft trans. of meno. Flyusi dlya Mekhanizovanogo Elektrozvaryuvannya, Kiev 1961 136p. Available copy will not permit fully legible reproduction.

Descriptors: (*Welding fluxes, Welding), (*Welding, Welding fluxes), Arc welding, Welds, Stability, Porosity, Welding rods, Steel, Ceramic materials, Fluxes(Fusion), Titanium alloys, Aluminum alloys, Copper alloys, Electrodeposition.

This booklet outlines various methods of mechanized welding in which fluxes are utilized. The role played by the flux in these welding methods is elucidated. Existing fluxes are classified according to their technique of preparation, their use, and other characteristics. The main emphasis is placed on the description of fluxes used at

home and abroad in arc welding and electroslag welding of steels and light metals. Details are given of the technique of preparation of fused fluxes, ceramic fluxes, and agglomerated fluxes. The booklet is intended for engineering-technical workers of the machine-building, ship-building and other branches of industry, as well as building-construction enterprises. (Author)

AD-617 100 Div. 26/1
CFSTI Prices: HC$5.00 MF$1.00

Foreign Technology Div., Wright-Patterson AFB, Ohio.
SPECIAL CASTING TECHNIQUES (CHAPTER 9),
ed. by N. P. Dubinin. 5 May 65, 170p
FTD-TT-64-1047
TT 65-62534

Unclassified report

Unedited rough draft trans. of mono. Stalnoe Lite:
Spravochnik dlya Masterov Liteinogo Proizvodstva
(Steel Casting: Foundrymen's Handbook) Moscow,
1961 p564-752.
Available copy will not permit fully legible reproduction.

Descriptors: (*Casting, Manufacturing methods), Castings, Molding, Ceramic materials, Centrifugal casting, Cermets, Graphite.

Special casting techniques are progressive production methods. These casting techniques include the following: metal-mold casting (chill mold casting), shell-mold casting, investment casting, centrifugal casting, and others. Each of these methods of casting has its own field of application, in which it is profitable. The basic advantage of the special casting techniques is that they produce castings of higher precision, so that the machining allowances can be reduced.

AD-617 101 Div. 26/1
CFSTI Prices: HC$6.00 MF$1.25

Foreign Technology Div., Wright-Patterson AFB, Ohio.
SEAMLESS TUBES: A TECHNICIAN'S HANDBOOK,
by Ya. L. Vatkin, O. A. Plyatskovskii, and Yu. I.
Vashchenko. 9 Apr 65, 209p FTD-TT-64-1255
TT 65-62535

Unclassified report

Unedited rough draft trans. of mono. Besshovnye Truby: Spravochnoe Rukovodstvo dlya Rabochikh, Mowcow, 1963 182p. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Pipes, Mechanical working), (*Handbooks, Pipes), (*Mechanical working, Pipes), Production, Drawing(Machine processing), Heating, Rolling(Metallurgy), Rolling mills, Cold working, Finishes + finishing.

The book describes in a concise and comprehensible form the basis of the production technology of seamless pipes as well as the individual plant units, which will aid the pipe workers to increase their professional knowledge. The book does not pretend to be an exhaustive description of the material and is merely a manual. It may also be useful to students of technical schools of metallurgy.

AD-617 131 Div. 13/4
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
MOVING LOADS ON THE SURFACE OF A CYLINDRICAL BORE IN AN INFINITE ELASTIC MEDIUM: PART I. THEORETICAL ANALYSIS OF LINE LOADS,
by R. Parnes, M. L. Baron, and H. H. Bleich.
May 65, 53p Memo. no. RM-4418-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Loading(Mechanics), Underground structures), (*Underground structures, Loading(Mechanics)), Cylindrical bodies, Structural shells, Elasticity, Shock(Mechanics), Load distribution, Stresses, Deformation, Fourier analysis, Series, Mechanics, Civil engineering.

This Memorandum considers a line load applied along a transverse circle that travels in the axial direction along the interior of a circular bore in an infinite elastic, homogeneous, and isotropic medium. Three cases of line loads are considered: the direction of the line load normal to the surface, tangential to the surface in the direction of the axis of the bore, and tangential to the circle of load application. In each case, the components of the applied line loads are expanded into a Fourier series in terms of the angular coordinate. Expressions for the stress and displacement components at points in the medium are derived for each term of the Fourier series as a function of the radial distance from the cavity axis and the longitudinal distance behind the wave front. Numerical results are presented for the axisymmetric case, n = 0, for both the stress and displacement components on the cavity boundary. (Author)

AD-617 133 Div. 26/3, 26/2
CFSTI Prices: HC$5.00 MF$1.00

Army Missile Command, Redstone Arsenal, Ala.
Directorate of Procurement and Production.
ALPHA AND OMEGA AND THE EXPERIENCE CURVE.
12 Apr 65, 168p

Unclassified report

Descriptors: (*Management engineering, Costs), (*Learning, Curve fitting), (*Weapons systems, Costs), Management control systems, Production control, Least squares method, Aircraft industry.

A detailed explanation is given of: (1) What the experience curve is: historical background and theory; (2) what type of data lends itself to the application of the experience curve; (3) how the curve is constructed, and how to use it; (4) what tables are available, and how to use them; (5) what computer products are available, and how to use them.

AD-617 190 Div. 31/4, 25/6
CFSTI Prices: HC$2.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
EXPLORATORY TESTS OF PROLATE SPHEROIDAL SHELLS UNDER EXTERNAL HYDROSTATIC PRESSURE.
Final rept.,
by John J. Healey. Jun 65, 26p Rept. no. 1868
Proj. S F013 01 03, Task 0214

Unclassified report

Descriptors: (*Structural shells, Hydrostatic pressure), (*Submarine hulls, Pressure vessels), Spheres, Buckling(Mechanics), Elasticity, Model tests, Thickness, Tensile properties, Titanium, Aluminum, Configuration.

Hydrostatic tests were conducted on two machined aluminum prolate spheroidal shells to evaluate existing theory for predicting elastic buckling strength. The test results demonstrated that an elastic buckling pressure

forty percent greater than predicted by available theory is possible for the geometry tested. Due to these encouraging results, two titanium prolate spheroidal shells were designed for a collapse depth of 30,000 ft to explore the use of this configuration for deep-depth pressure hulls. The thicknesses of the shells were varied in order to increase structural efficiency. Two models were machined and tested to collapse under external hydrostatic pressure. The test results indicate that a titanium spheroidal shell designed for collapse at 30,000 ft with a yield strength of 110,000 psi, a length-to-diameter ratio of 2, and a thickness variation along its length would weight approximately 76 percent of its displacement. The structural efficiency of the spherical shell and several other prolate spheroidal shells are compared for this material and collapse depth. (Author)

14. Methods and Equipment

AD-616 477 Div. 30/3

National Research Council of Canada, Ottawa (Ontario). Div. of Radio and Electrical Engineering.
CRUCIBLE FOR GROWTH OF ALKALI HALIDE CRYSTALS FROM THE MELT,
by J. Rolfe. 30 Nov 64, 1p NRC-8340
Unclassified report

Pub. in Review of Scientific Instruments v36 n3 p404 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Crucibles, Crystal growth), (*Crystal growth, Crucibles), Platinum alloys, Alkali metals, Halides, Single crystals, Canada.

A platinum alloy crucible has been used in a crystal-pulling apparatus for the growth of alkali halide single crystals. The addition of a conical top to the normal hemispherical or cylindrical crucible has three advantages. (1) If the crucible is heaped full of powdered alkali halide initially, the top surface of the melt will be just below the junction between the conical and the cylindrical part. (2) The crucible becomes very rigid and easily able to withstand the stresses caused by contraction of the alkali halide on cooling. (3) The conical top, made springy by 3-mm-deep cuts all round, fitted snugly into the inside of a 57-mm-o.d. Vycor tube used for a crucible enclosure, conforming to the non-circular cross section of the tube, providing a firm centering for the crucible, and preventing convection currents flowing upwards between the crucible and the enclosure.

AD-616 496 Div. 30/4, 2/3

Washington Univ., Seattle. Dept. of Atmospheric Sciences.
AN AUTOMATED RADIATION CLIMATOLOGY STATION AT PT. BARROW, ALASKA,
by L. A. Stroschein. 21 May 65, 14p
Technical rept. no. TR-13
Contract Nonr47724, Proj. NR307 252
Unclassified report

Pub. in Science in Alaska. Proceedings of Alaskan Science Conference (15th), College, Alaska, 31 Aug-4 Sep 64 p61-72 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Weather stations, Instrumentation), (*Climatology, Scientific research), Automation, Albedo, Air, Temperature, Solar radiation, Measurement, Radiometers, Alaska, Climatology, Atmospheric temperature, Integrators, Thermocouples, Counting methods.

A system was sought for recording data obtained in radiative climatological studies that would record continuous measurements of total global, net total, and global short wave radiation, periodic measurement of the albedo, ambient air temperature, and plate temperature of the total radiometer. A mechanical integrator recorder was used that allows concurrent data acquisition on reduction by one man with little or no experience in electronics. The equipment used included a Sodeco counter-printer Model 1Tpb3, two Sodeco TCeF counters, an automatic ice-point thermocouple reference system, the Kipp and Zonen solarimeter, and the Funk radiometer.

AD-616 509 Div. 24/2, 12/1, 2/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
HOW GOOD IS THE LUNIK III MOON PHOTOGRAPHY,
by Merton E. Davies. 4 Jan 60, 10p
Rept. no. P-1892
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Lunar probes, Photographs), (*Moon, Photography), Resolution, Astronomical cameras, Telescopes, USSR.

In a previous paper, 'Lunar Exploration by Photography from a Space Vehicle,' the author discussed a photographic system for obtaining high-quality pictures of the moon. Included was a comparison of the surface detail yielded by astronomical lunar photography with that afforded by conventional aerial photography. It is the purpose of the present paper to compare the quality of the released Soviet pictures of the back side of the moon with that of conventional, earth-originated photographs of the front side. (Author)

AD-616 516 Div. 30/5, 18/3
CFSTI Prices: HC$7.45 MF$2.25

Army Missile Command, Redstone Arsenal, Ala.
VALUE ENGINEERING SYMPOSIUM ON ADVANCEMENT IN THE STATE OF THE ART, 18-19 NOVEMBER 1964.
19 Nov 64, 444p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Symposia, Systems engineering), (*Systems engineering, Costs), (*Costs, Systems engineering), Analysis, Management engineering, Reports, Mangement control systems, Defense systems, Statistical analysis, Effectiveness, Decision making, Economics, Quality control, Reliability.

The three-fold purpose of the symposium was to induce crossfertilization among Value Engineers by presentations and discussions of the latest techniques and trends, to emphasize the DoD policy of raising both the stature and productivity of Value Engineering, and to explain the intent and interpretation of current Armed Service Procurement Regulations concerning Value Engineering. In a further effort to provide a means of exchanging useful information, this report was prepared. Included in this report is a copy of each paper accepted by the symposium program committee along with a brief biography of each of the authors. Time limitations did not permit each paper to be presented at the symposium, but each one is included here in order to give the complete picture of the state of the art of Value Engineering.

AD-616 524 Div. 30/5, 18/3
CFSTI Prices: HC$1.00 MF$0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A DYNAMIC PROGRAMMING APPROACH TO A COST-EFFECTIVENESS PROBLEM,
by William J. Sacco and Palmer R. Schlegel.

Feb 65, 21p BRL-MR-1637
Proj. 1P014501A14B

Unclassified report

Descriptors: (*Weapon systems, Costs), (*Dynamic programming, Costs), (*Costs, Weapon systems), Optimization, Tables, Effectiveness, Mathematical programming, Systems engineering.

The selection of an optimal weapon system on a cost-effectiveness basis is formulated as a mathematical programming problem. The problem is solved using the functional equation technique of dynamic programming. The determination of certain 'appropriate' values for the arguments of the functional equations is illustrated by a numerical example. The arguments are obtained in a systematic manner by resorting to the construction of auxiliary, bookkeeping tables. (Author)

AD-616 686 Div. 30/3, 17/7
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MAGNETIC BALANCE FOR MEASURING MAGNETIC SUSCEPTIBILITIES.
Master's thesis,
by Lawrence Turley James. Jun 65, 72p
Rept. no. SP/PH/65-12

Unclassified report

Descriptors: (*Balances, Magnetic properties), (*Magnetic properties, Balances), (*Paramagnetic materials, Magnetic properties), Measurement, Rare earth compounds, Transition elements, Temperature, Intermetallic compounds, Yttrium alloys, Cobalt alloys.

The final design and construction of a Weiss-Foex magnetic balance were completed and the balance was adapted to make measurements at low temperatures. The balance was used to measure the paramagnetic susceptibility of a rare earth-transition metal compound and to determine the temperature dependence of the susceptibility. The initial measurements and calibration led to an over-all accuracy of ±6.08% in the range of susceptibilities of from 2 to 100 X 0.000001 emu/gram. Ferrous ammonium sulfate and nickel chloride were used as standards for calibration. The compound YCo2 was investigated and proved to have a paramagnetic moment which followed the Curie-Weiss Law. The 'Curie constant' was found to be .19 X 0.000001 emu-K/gram and the 'Weiss constant' was found to be 53 K. (Author)

AD-616 719 Div. 30/3, 25/4
CFSTI Prices: HC$1.00 MF$0.50

Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
FEASIBILITY STUDY OF A LASER FLOWMETER FOR LOCAL VELOCITY MEASUREMENTS IN GAS FLOW FIELDS,
by J. W. Foreman, Jr., E. W. George, and R. D. Lewis. May 65, 25p Technical note R-149

Unclassified report

Descriptors: (*Lasers, Flowmeters), (*Flowmeters, Lasers), Gas flow, Measurement, Velocity, Doppler effect, Particles, Scattering, Smokes, Feasibility studies.

The Doppler shift in laser light scattered from smoke particles in a moving gas has been detected by optical heterodyne techniques, thereby verifying the feasibility of a laser Doppler flowmeter for measurement of local velocities in contaminated gas flow fields. (Author)

AD-616 739 Div. 30/3
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A STUDY OF RUBIDIUM VAPOR MAGNETOMETERS.
Master's thesis,
by Joseph Clifford Giles. Jun 65, 87p
Rept. no. SP/PH/65-10

Unclassified report

Descriptors: (*Magnetometers, Rubidium), (*Rubidium, Magnetometers), Temperature, Operation, Performance(Engineering), Terrestrial magnetism, Periodic variations, Oscillation, Vapor.

The operational characteristics of a two-cell Rb87 vapor magnetometer and a four-cell Rb85 vapor magnetometer are investigated. Both instruments are found to have optimum operating temperatures of about 40 C. The two-cell magnetometer is found to have polar deadzones with widths of 48 degrees and to have an equatorial deadzone with a width of 20 degrees. The four-cell magnetometer is found to have a 23 degrees equatorial deadzone. The magnetometers are shown to follow periodically varying fields with frequencies as high as 48 kc/s. The magnetometers are shown to follow transient field charges as large as 18.1K gamma occurring in times as small as three microseconds. (Author)

AD-616 758 Div. 30/3
CFSTI Prices: HC$2.00 MF$0.50

Institute of Science and Tech., Univ. of Michigan, Ann Arbor.
A HIGH-TEMPERATURE BLACKBODY RADIATION SOURCE.
Technical rept.,
by H. Y. Yamada. Jun 65, 26p
Rept. no. 4613-86-T
Contract SD91, ARPA Order 236

Unclassified report

Rept. of BAMIRAC.

Descriptors: (*Blackbody radiation, Sources), High-temperature research, Standards, Graphite, Emissivity, Calibration, Temperature, Measurement.

A high-temperature blackbody radiation source, consisting of an electrically heated graphite tube with a small centrally located hole through one wall, was developed for use as a secondary standard in the calibration of radiometric and spectrometric instruments. The spectral emissivity of this source, at 0.65 microns, was calculated by the DeVos method, for which graphite emissivities and temperature gradients were measured in situ with an optical pyrometer. The values of source emissivity ranged from 0.9981 ± 0.0004 at 1000C to 0.9997 ± 0.0002 at 2000C. (Author)

AD-616 777 Div. 30/3, 8/2
CFSTI Prices: HC$6.00 MF$1.25

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
TRANSDUCER WORKSHOP (4th) 18-19 JUNE 1964, WRIGHT-PATTERSON AFB, OHIO.

1964, 227p Twg Document no. 112-64
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Transducers, Acceleration), (*Symposia, Transducers), Test equipment, Calibration, Accelerometers, Semiconductor devices, Real time, Pressure.

Contents: Considerations in the selection of a transducer to measure both static and dynamic linear acceleration; Evaluation of a transducer information center; Some aspects of transducer calibration techniques; The evaluation of several commercially available accelerometers; Recent developments in the semiconductor transducer field; Electronic load cell applications in rocket and space vehicle testing and design; A hydraulic step function pressure generator for transducer evaluation; Real time compensation of thermal sensors; Vibration isolation of flush diaphragm pressure transducers used on rocket motors; Improvements in plastic film pressure transducers; Transducers as pre-sampling filters in pulse code modulation telemetry systems; Transducer technology at the Air Force Rocket Propulsion Laboratory, Edwards, California; Research on transducers for extreme environmental temperatures.

AD-616 786 Div. 30/5, 17/2
CFSTI Prices: HC$2.00 MF$0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
PRINCIPLES OF METALLOGRAPHIC ETCHING.
Technical rept.,
by Norbert D. Greene, Peter S. Rudaw, and Linda Lee. Jun 65, 26p Rept. no. TR-2
Contract Nonr59117
Unclassified report

Descriptors: (*Chemical milling, Alloys), (*Metallography, Chemical milling), Tin alloys, Zinc alloys, Sodium compounds, Hydroxides, Electrolytes, Analysis.

The principles of metallographic etching have been determined by electrochemical and optical measurements on tin-zinc alloys in sodium hydroxide electrolytes. The minimum dissolution rate ratio and the minimum amount of selective dissolution necessary to achieve metallographic contrast of phases have been measured. Etching rate and contrast are uniquely defined by etching potential by potentiostatic, electrolytic and chemical etching methods. (Author

AD-616 893 Div. 30/3
CFSTI Prices: HC$0.75 MF$0.50

Naval Research Lab., Washington, D. C.
SOME FACTORS INFLUENCING THE LIFE AND PERFORMANCE RELIABILITY OF HIGH-PRECISION POTENTIOMETERS.
Final rept.,
by V. G. FitzSimmons and J. B. Romans. 12 May 65, 20p Rept. no. NRL-6287
Task RREN04 005 652 1F00s 21-02
Unclassified report

Descriptors: (*Potentiometers, Reliability(Electronics)), Life expectance, Performance(Engineering), Lubricants, Ball bearings, Resistance(Electrical), Torque, Wear resistance, Naval equipment, Computers, Films.

The study was conducted on a number of linear precision potentiometers of the type used in Navy computer systems which had been subjected to life testing by a Navy contractor. One manufacturer had used oil as the contact-arm and winding lubricant; the other three used greases. Most of the wear was concentrated on contact arms and was most severe where oil had been used as the lubricant. Potentiometers made with precious-metal windings exhibited the least wear. Both oil and grease, usually in very small amounts, had been used for lubricating the potentiometer ball bearings. About half the bearings were rough in operation, and two had become locked because of wear and fretting corrosion products. Size of the contact-arm-wear scars showed no simple correlation with change in total resistance or torque required to operate the potentiometers. Where wear scars were large, increasing wear coincided with increase in departure from linearity. Though noise levels of all potentiometers rose during the life tests, those with contact arms having the greatest wear at the conclusion of the tests tended to produce the least noise. The use of low-volatility lubricants in conjunction with a nonwettable fluorochemical barrier to prevent creeping of the oil from vital areas is recommended. (Author)

AD-616 895 Div. 24/2, 18/2
CFSTI Prices: HC$3.00 MF$0.75

North American Aviation, Inc., Columbus, Ohio.
IMAGE QUALITY ENHANCEMENT.
Final rept. for Dec 62-Feb 64,
by Robert W. Brainard and George N. Ornstein.
Apr 65, 64p
Contract AF33 616 7996, Proj. 7183, Task 718302
AMRL TR-65-28
Unclassified report

Descriptors: (*Photographic reconnaissance, Photointerpretability), (*Aerial photography, Photographic acuitance), (*Photographic images, Visual perception), Display ystems, Intelligibility, Visibility, Video signals, Image intensifiers(Electronics), Electron optics.

A technique for enhancing the quality of imagery was investigated. The technique consists of obtaining a video signal from a transparency and adding to this signal its first and/or second derivative(s). The efficacy of the technique was evaluated by comparing imagery produced by the video signal and its derivative(s) with imagery produced by the video signal alone. The imagery investigated consisted of standard test patterns and aerial photographs. The processed test patterns were quantitatively analyzed to determine the resolution, contrast and acutance of the imagery. The results indicate: (1) differentiation enhances image quality, as indicated by the resolution, contrast and acutance metrics, (2) greatest enhancement is produced by operations which include second-order differentiation, and (3) the least enhancement is produced by first-order differentiation. The aerial photographic imagery shows the same enhancing effects as those obtained with the test patterns. (Author)

AD-616 897 Div. 30/4, 6/6, 6/1, 6/5
CFSTI Prices: HC$8.00 MF$2.25

RCA Service Co., Inc., Patrick AFB, Fla.
THE ACCURACY OF ETR INSTRUMENTATION.
Technical rept.,
by R. H. Ackerson, V. Chew, A. S. Baron, W. N. Beall, and R. A. Brown. May 65, 497p Rept. no. ETR-TR-65-7
MTC TDR-64-1, superseded, AD 432 034, superseded
Unclassified report

Available copy will not permit fully legible reproduction.

Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Tracking, Performance(Engineering)), Radar tracking, Instrumentation, Test facilities, Data processing systems, Errors, Sources, Systems engineering, Analysis of variance, Optical tracking, Underwater tracking, Reliability.

The annual summary statements of the accuracy of Eastern Test Range Tracking Instrumentation are presented. The statements are based on studies conducted by RCA Systems Analysis. The report also provides brief system descriptions and a detailed discussion of the definition of errors encountered in tracking system evaluations, methods and techniques used to estimate errors, error sources, specific ETR methodologies including data analysis flow diagrams and a discussion of the variance - covariance error propagation required to determine the accuracy of reduced position, velocity and acceleration data. Work on the determination of instrumentation accuracy is a continuing project and revisions and refinements to the estimates of accuracy are issued periodically as additional information is made available. (Author)

AD-616 924 Div. 30/4, 9/5
CFSTI Prices: HC$2.00 MF$0.50

Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
HEAT TRANSFER TECHNIQUES AND MEASUREMENTS IN THE DOUGLAS AEROPHYSICS LABORATORY HYPERVELOCITY IMPULSE TUNNEL,
by H. R. Miller. Dec 64, 45p Rept. no. SM-43066
Unclassified report

Descriptors: (*Resistance thermometers, Heat transfer), (*Colorimeters, Heat transfer), (*Heat transfer, Meters), (*Aerodynamic heating, Heat transfer), Shock tubes, Theory, Calibration, Production, Data, Stagnation point, Gas flow, Measurement, Instrumentation.

The report presents the theory, fabrication, calibration, and data reduction procedures for thin-film resistance thermometer and calorimeter-type heat transfer rate gages. Included, also, is a section on experimental measurements and experience covering the following topics: development of a correlation parameter for stagnation point heat transfer measurements based on Fay-Riddell theory; estimation of the accuracy of experimental measurements; discussion of the effects of flow contamination on heating rates; and comments on heat transfer instrumentation used in the HIT. (Author)

AD-616 931 Div. 30/5, 17/2, 17/5, 31/4
CFSTI Prices: HC$2.00 MF$0.50

United States Steel Corp., Monroeville, Pa. Applied Research Lab.
DEVELOPMENT OF A KIC STRESS-CORROSION TEST SPECIMEN.
Technical rept.,
by S. T. Rolfe. 1 Mar 65, 27p Rept. no. S-23304
Contract NObs88540, Projs. 39 018 002 29, SS050 000, Task 1567
Unclassified report

Descriptors: (*Corrosion, Stresses), (*Fracture(Mechanics), Test methods), (*Steel, Fracture(Mechanics)), Toughness, Maraging steels, Nickel alloys, Chromium alloys, Molybdenum alloys, Environmental tests, Vanadium alloys, Metal plates, Submarine hulls.

A study was made to develop a KsubIC stress-corrosion test that would be suitable for investigating the phenomenon that the effective fracture toughness of certain materials may be reduced if a flaw in the material can extend by stress corrosion to a critical size. The results of the study indicate that by appropriate modification, the standard KsubIC slow-bend fracture-toughness test can be used to demonstrate the effect of stress corrosion on fracture toughness. The modification consists of notching the specimen face so that plane-strain fracture can be obtained in relatively small specimens of tough materials. The fatigue-cracked area is surrounded by the appropriate corrosive environment and the specimen is dead-weight-loaded as a cantilever beam. Preliminary results on a 12Ni-5Cr-3Mo maraging steel (yield strength of about 175 ksi and Charpy V-notch energy absorption of about 35 ft-lb) have shown that this steel failed by plane-strain fracture at values ranging from 0.8 KIC at 10 hours to 0.3 KIC at 400 hours when the fatigue crack was exposed under stress to synthetic sea water. To date, similar failures have not been observed in the 5Ni-Cr-Mo-V experimental HY-130/150 steel after more than 500 hours in test. (Author)

AD-617 010 Div. 24/2, 6/3, 18/2

Air Force Cambridge Research Labs., Bedford, Mass.
MULTIBAND SPECTRAL SYSTEM FOR RECONNAISSANCE. Instrumentation papers,
by Carlton E. Molineux. 1965, 17p
Rept. no. IP-60, AFCRL 65-282
Contract AF19 628 4766, Proj. 7901, ARPA Order 500
Unclassified report

Pub. Photogrammetric Engineering p131-43 Jan 1965
(Copies not available to DDC or Clearinghouse customers).
Presented at the Annual Meeting of the Society (30th) Washington, D. C., March 17-20, 1964.

Descriptors: (*Multiband spectral reconnaissance, Aerial photography), (*Photographic reconnaissance, Nuclear explosions), (*Aerial photography, Multiband spectral reconnaissance), Detection, Underground explosions, Explosion effects, Airborne, Camera components + accessories, Spectrum analyzers, Spectra(Infrared), Topographic cameras, Color photography, Photointerpretation.

A unique airborne spectral camera and data reduction system has been developed for reconnaissance of terrain surfaces and especially for detecting manifestations of underground nuclear test activity. The system operates in the 0.35 to 5.0 micron region of the visible and near-infrared spectrum. The airborne system consists of a nine-lens multiband camera, associated color reference cameras, a dual spectrometer system, cartographic camera, and sky-light recording camera, flown in a C-130 aircraft. Specialized color enhancement and printing techniques emphasize the spectral reflectivity differences on the film to enable analysis of surface effects. Ground spectral data are collected to assist the interpretation of aerial imagery significance. Photointerpretation of vegetation and geologic conditions by simultaneous photography in narrow spectral regions will be advanced by this system. (Author)

AD-617 068 Div. 30/3, 10/6, 10/7
CFSTI Prices: HC$3.00 MF$0.75

Wyoming Univ., Laramie.
A MACH-ZEHNDER INTERFEROMETER ANALYSIS OF THE SOLID PROPELLANT COMBUSTION PROCESS. Master's thesis,
by Earl I. Hashitate. Jun 65, 75p
Contract AF33 608 1134
Unclassified report

Descriptors: (*Solid rocket propellants, Combustion), (*Interferometers, Solid rocket propellants), (*Combustion, Solid rocket propellants), Heat transfer, Pressure, Temperature, Burning rate, Analysis, Theory, Mathematical analysis.

AD-617 097 Div. 30/3
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
TO DETERMINE RESERVES FOR SYSTEMS OF REPEATED ACTION,
by A. D. Solovev. 12 May 65, 11p
FTD-TT-65-13
TT 65-62531
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Energetika i Transport n2 p124-9 1962.

Descriptors: (*Redundant components, Instrumentation), Reliability(Electronics), Probability, Computers, USSR.

A method is described which determines the number of spare instruments necessary for satisfactory operation of a group of n identical instruments for a long period of time. The results of this investigation can be applied to evaluation of the reliability of a computer system. (Author)

AD-617 189 Div. 30/3
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
A FOUR CHANNEL OSCILLOSCOPE RECORDING SYSTEM,
by Ronald B. Tussing. 18 May 65, 47p
Rept. no. NOLTR-65-21
Tasks RUME4E000F008 11 002,
RRRE51001F008 2103 002
Unclassified report

Descriptors: (*Underwater explosions, Recording systems), (*Oscilloscopes, Recording systems), (*Recording systems, Oscilloscopes), (*Shock waves, Pressure), Solid state physics, Fire control systems.

A control unit using unique solid state circuits forms the basis of a compact, versatile recording system. It is used with an oscilloscope, a camera, and piezoelectric gages to record underwater explosion pressures. The major functions performed by the control unit are to: generate a precise calibration step; unshort and connect the firing line; fire the charge; trigger the oscilloscope; provide delays (0-1 sec) for delaying the charge firing or oscilloscope triggering; and provide gage cable terminations. Procedures for calibrating and using the system with typical oscilloscopes and cameras are discussed. (Author)

AD-617 193 Div. 30/5, 26/1
CFSTI Prices: HC$2.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
PHOTOELASTICITY: ITS APPLICATION IN THE MECHANICAL INDUSTRIES,
by Henri Leboiteux and Robert Boussard.
Mar 65, 27p RSIC-387
TT 65-62547
Unclassified report

Trans. of la Pratique des Industries Mecaniques (France) v29 n1 p3-7, n2 p31-6 1946.
Translated by Joint Publications Research Service, Washington, D. C.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Photoelasticity, Mechanical engineering), (*Mechanical engineering, Photoelasticity), Stresses, Materials, Determination, Strength, Measurement, Optical analysis, Optical properties, Elasticity, Theory, France, Welding, Sheets.

It is shown how photoelasticity makes it possible to determine the dimensions and the forms of parts destined for supporting given stresses, by means of an experimental solution of the equations of the theory of elasticity. The second part is devoted to the practical applications of photoelasticimetry. A simple part is chosen as an example for the determination of the stresses on a section. A wrench is studied: this case, representing a two-dimensional problem, is rigorously amenable to photoelasticimetry. Finally, the important problem of the welding of sheet metal, is discussed. (Author)

AD-617 212 Div. 30/3

Suffield Experimental Station, Ralston (Alberta).
ON THE ANOMALOUS BEHAVIOUR OF BLAST PRESSURE GAUGES WITH FERROELECTRIC CERAMIC ELEMENTS,
by J. C. Muirhead and W. J. Fenrick. 3 Mar 64, 2p
Unclassified report

Pub. in Journal of Scientific Instruments v41 p483-4 Jul 1964 (Copies available only to DDC users).

Descriptors: (*Pressure gages, Electrical properties), (*Ceramic materials, Pressure gages), Ferroelectric crystals, Blast.

A brief outline is given of the spontaneous charge release and absorption effects in ferroelectric ceramic pressure gauges. These effects appear to be caused by electric fields. (Author)

AD-617 213 Div. 30/3

Suffield Experimental Station, Ralston (Alberta).
A BLAST WAVE DENSITY GAUGE USING BETA-RADIATION,
Revised ed.,
by J. M. Dewey and W. A. Anson. 22 Jul 63, 5p
Unclassified report

Pub. in Journal of Scientific Instruments v40 p568-72 Dec 1963 (Copies available only to DDC users)
Revision of manuscript submitted 16 Apr 63.

Descriptors: (*Shock waves, Densimeters), (*Densimeters, Shock waves), Gases, Density, Beta particles, Pressure, Measurement, Pressure gages, Erbium, Isotopes, Canada, Blast.

A gauge has been designed to determine the gas density in blast waves by recording the attenuation of beta rays from erbium-169 using a compact detector unit and transistor amplifier. The output signal is transmitted over several thousand feet of coaxial cable and recorded as an f.m. signal on magnetic tape. Voltage and density calibration units are described. The gauge has been used to study blast waves in the 60 to 5 lb/sq in over-pressure region, and some results are presented. The present accuracy of about ±10% may be improved by using a source

of greater activity and by strengthening the mounting system to prevent slight changes of the source-detector geometry. (Author)

AD-617 220 Div. 30/5, 25/4

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
SEMI-INFINITE DIFFRACTION GRATINGS. I.
Scientific rept. for Feb-May 65,
by Norman L. Hills and Samuel N. Karp. Jun 64, 34p
Rept. no. EL-1
Contract Nonr28548, Proj. NR371 146
Unclassified report

Pub. in Communications on Pure and Applied Mathematics v18 n1/2 p203-33 Feb-May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Diffraction gratings, Electromagnetic waves), Resonance, Diffraction, Cylindrical bodies.

An explicit solution is given for diffraction of a plane wave by a semi-infinite grating of small conducting cylinders. The far field pattern is discussed. A class of resonant cases is analyzed. The results are compared with those obtainable by a single scattering approximation, as well as a 'Kirchoff' approximation. (The latter term is defined as the treatment of each cylinder as if it were immersed in an infinite grating.) All the solutions show multiple shadow boundaries. The comparison brings out the effect of interactions, and indicates the usefulness and limitation of the approximations. It appears that the exact solution is necessary to give the fine detail of the cylindrical wave. The much simpler Kirchoff solution is otherwise adequate, even in certain resonant cases. (Author)

15. Military Sciences

AD-616 502 Div. 18/1

RAND Corp., Santa Monica, Calif.
ON THE VALUE OF OVERSEAS BASES,
by Albert Wohlstetter. 5 Jan 60, 17p
Rept. no. P-1877
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Military facilities, Antimissile defense systems), Feasibility studies, Early warning systems, Warfare.

Overseas bases are of great importance, but not all arguments to support their importance are right. Among those that are wrong is the notion that in the face of a well coordinated enemy missile attack, missiles placed overseas without protection are sure either to retaliate and disrupt the opening enemy salvo or to provide extra warning for the continental U.S. They can guarantee neither one. But deterring a well coordinated thermonuclear attack on the U.S., while vital, is by no means all we want to do. We must have insurance that we can limit damage in case deterrence fails whether by accident or deliberation. And overseas bases can help disrupt the poorly coordinated attacks that are now likely in the event that the war starts by accident (and this, in turn, if we have a good high confidence deterrent, is more likely to be the way a war starts if it starts at all). Finally, the overseas bases play a principal role in limited wars. (Author)

AD-616 512 Div. 18/4, 1/4

RAND Corp., Santa Monica, Calif.
THE EVALUATION OF THE EFFECT OF THE ENVIRONMENT ON A COMPLEX OPERATION,
by J. Doyne Sartor. 29 Jan 59, 14p
Rept. no. P-1895
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Armed forces operations, Operations research), (*Operations research, Aerial reconnaissance), (*Aerial reconnaissance, Climatology), (*Weather forecasting, Flight), (*Climatology, Armed forces operations), Reconnaissance planes, Take-off, Landings, Effectiveness, Costs.

The integrated effect of the environment on a complex operation is discussed and a method for quantitative evaluation presented. The method may be employed directly in a climatological study of an operation. The total cost of an operation can be obtained in this way using climatological information and forecast data. A comparison of these costs can be used to determine the relative value of forecasts. The method is applied to a reconnaissance operation as an example of its use in a climatological study. (Author)

AD-616 557 Div. 18/7, 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
STRATEGIC GAMING,
by Olaf Helmer. 10 Feb 60, 19p
Rept. no. P-1902 Unclassified report

Prepared for presentation at the SHAPE Operations Research/Scientific Advisory Conference(5th). Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Game theory, Strategic warfare), (*Strategic warfare, Game theory), Tactical warfare, Decision making, Probability.

The paper uses a number of exhibits relating to a strategic procurement game in order to illustrate various concepts and techniques of operational gaming. In particular, the relative merits of play by human players versus machine play are discussed, as are those of rigid rules versus umpire rulings. The roles of the experts in different aspects of gaming are examined and illustrated. (Author)

AD-616 566 Div. 18/7, 15/1
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ALLOCATION OF TWO TYPES OF AIRCRAFT IN TACTICAL AIR WAR: A GAME-THEORETIC ANALYSIS,
by L. D. Berkovitz. 18 Feb 60, 26p
Rept. no. P-1914
Unclassified report

Descriptors: (*Game theory, Tactical warfare), (*Tactical warfare, Game theory), (*Aerial warfare, Game theory), Bombers, Fighters, Optimization, Equations, Strategic warfare.

The problem of allocating two types of aircraft (bombers and fighters) among three different air tasks (counter air, air defense, and support of ground operations) in a multistrike campaign is analyzed as a two-sided war game. It is assumed that a bomber can be used in either the counter air or ground support operations, while a fighter can be used in either the air defense or ground support roles. That is, bombers and fighters have one task-ground support-in common. Optimal employment during the last strikes of the campaign consists of a concentration of all resources on support of ground operations. Optimal employment during the early strikes of the campaign requires randomization by both sides. (Author)

AD-616 576 Div. 18/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
LECTURE ON CIVIL DEFENSE,
by Harold H. Mitchell. 2 Mar 60, 11p
Rept. no. P-1927
Unclassified report

Prepared for presentation to Staff College of the New York State Civil Defense Commission, February 9, 1960, at West Point, New York.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Civil defense systems, Survival), United States, USSR, Deterrence, Nuclear warfare, Nuclear warfare casualties, Foreign policy, Medicine.

Civil Defense is discussed in terms of the following objectives: (1) alleviating the catastrophe of a nuclear attack on the United States; (2) reconstructing and

reconstituting our nation to its pre-attack status; (3) the conducting of a peacetime foreign policy and the implementing of a broad deterrence strategy.

AD-616 659 Div. 18/3, 1/2, 15/1
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A COMPARATIVE STUDY OF PREDICTION TECHNIQUES,
by Bernice B. Brown. 29 Apr 60, 33p
Rept. no. P-1980
Unclassified report

Presented at the Decennial Logistics Research Conference, Washington, D. C., 20-22 Jan 60.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Spare parts, Mathematical prediction), (*Aircraft equipment, Spare parts), Statistical processes, Statistical functions, Aircraft engines, Airframes, Fire control system components, Communication systems.

Methods for improving the prediction of demand, specifically demand for aircraft spare parts, are sought where the prediction is based on an estimate of the underlying pattern of demands per program element. Seven prediction techniques were compared: (1) division of the total number of demands by number of flying hours in the experience period; (2) the demands are used to enter a table giving the upper 90% confidence level for the mean of a Poisson variable; (3) a nonparametric Poisson technique using as a constant the value of the normal deviate for the 90% confidence interval; (4) a technique using an equation similar to that used in (3); (5) an adaptation of the minimum Normit Chi-Square method (J. Berkson, 'Tables for use in estimating the normal distribution function by Normit analysis,' Biometrika, 44:411 (1957)); (6) a technique similar to (5) but using the transformation log (1 + age); and (7) the actuarial method of the Air Force for predicting engine failures (T. O. 00-25-128 of April 18, 1958).

AD-616 664 Div. 18/1, 23/5, 28/5

RAND Corp., Santa Monica, Calif.
AN ANALYSIS OF THE DECISION-MAKING FUNCTIONS OF A SIMULATED AIR DEFENSE DIRECTION CENTER. Revised ed.,
by A. Sweetland and W. W. Haythorn. 20 Sep 60, 26p
Rept. no. P-1988
Unclassified report

Revision of rept. dated 11 May 60.
Available only for reference use at DDC Field Services.
Copy is not available for public sale.

Descriptors: (*Air Defense Command, Decision making), (*Decision making, Stress(Psychology)), (*Early warning systems, Decision making), Performance(Human), Search radar, Identification systems, Tracking, Systems engineering, Behavior, Statistical analysis, Analysis of variance, Factor analysis, Tables, Graphics, Simulation.

Two crews from the Air Defense Command were charged with the responsibility of defending the United States against hostile attack and then exposed to high stress situations in a simulated manual Air Defense Direction Center. Their responses were analyzed to determine what, if any, characteristic response patterns emerged. The following were suggested by the analysis of the data: (1) When reality is too complex to deal with first-hand, a man-machine system will construct a model of reality. This model is continuously modified by the system (to take into account changes in reality and changes in proficiency) but the modifications always reflect the charged responsibility. (2) The model of reality is then evaluated to determine the best of several possible responses. Responses are selected in terms of which most effectively meets the charged responsibility. (3) A system, apparently unconsciously, operates at a level of effort that remains relatively constant for the job at hand and will exceed this level rarely and for short intervals only. (4) A system apparently orders reality on a subjective list ranging from 'immediate response is mandatory' to 'no response is necessary' and then responds reading from the top of the list to the point of the system level of effort. (5) The major effect of stressing the system is to provoke a more careful culling of the list rather than increase the level of effort. (Author)

AD-616 978 Div. 18/7
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
GENERAL ANDRE BEAUFRE ON STRATEGY: A REVIEW OF TWO BOOKS,
by Bernard Brodie. Jun 65, 9p Rept. no. P-3157
Unclassified report

Prepared for publication in an early issue of the journal Survival, pub. by the Inst. for Strategic Studies, London.

Descriptors: (*Military strategy, Reviews), Strategic warfare, Deterrence, Theory, France.

AD-617 061 Div. 18/1, 20/6, 20/3
CFSTI Prices: HC$3.00 MF$0.75

Stanford Research Inst., Menlo Park, Calif.
INTRODUCTION TO RADIOLOGICAL DEFENSE PLANNING,
by Carl F. Miller, Hong Lee, and James D. Sartor.
May 65, 67p
Contract N228 62479, Proj. MU5069, Task 3231C
Unclassified report

Descriptors: (*Radiological warfare, Defense systems), (*Civil defense systems, Radiological warfare), Radiological dosage, Radioactive fallout, Shelters, Decontamination, Countermeasures, Dose rate, Radiation hazards.

Planning of RADEF countermeasures is based on the availability of basic radiological data and on techniques for applying such data. The data and their parameters are (1) a decay curve representing decrease of radiation intensity (r/hr) with time after a detonation; (2) standard intensity, i.e. radiation intensity corrected to one hour after detonation; and (3) time of arrival after fallout. Major parameters involved in the planning techniques are (1) the shelter shielding residual number RNI, where the residual number is the ratio of the exposure dose (or dose rate) received at a given location when a countermeasure is applied to that received without the countermeasure; (2) the shelter stay (or exit) time; (3) the postattack operational residual number RN2 for decontamination crews, evacuation, or other early postattack countermeasures; and (4) the long-term postattack residual number RN3. The use of such factors in the solution of RADEF problems is described, and data for making planning calculations for a number of RADEF situations are presented in the form of graphs.

AD-617 111 Div. 18/1
CFSTI Prices: HC$3.00 MF$0.75

Hudson Inst., Harmon-on-Hudson, N. Y.
AN EVALUATION OF THE SHELTER POTENTIAL IN MINES, CAVES AND TUNNELS.
Final research rept.,
by Robert A. Krupka. 11 Jun 65, 76p
Rept. no. HI-507-RR
Contract OCD PS64 116, Task 4211B

Unclassified report

See also AD-617 112.

Descriptors: (*Shelters, Underground structures), (*Underground structures, Shelters), Feasibility studies, Costs, Civil defense systems.

This study examines the availability and the potential of using mine space (and to a lesser extent, cave and tunnel space) in future civil defense programs. It provides background information concerning previous research on this study, and makes new estimates of usable space and yearly space increases, based on a sample survey of a few mines. The possibilities and costs of developing new mine space and adapting mines to shelter use is also discussed. Information on caves and tunnels is also included. Three appendices (AD-617 112) are included with this report, containing detailed listing of mines and caves located by the National Fallout Shelter Survey, and detailed listings and locations of vehicular tunnels. This data is intended for possible use by those who might wish to undertake more specific studies of shelter potential in mines, caves, and tunnels. (Author)

AD-617 112 Div. 18/1
CFSTI Prices: HC$4.00 MF$1.00

Hudson Inst., Harmon-on-Hudson, N. Y.
AN EVALUATION OF THE SHELTER POTENTIAL IN MINES, CAVES AND TUNNELS. APPENDICES I, II, III,
by Robert A. Krupka. 11 Jun 65, 147p
Rept. no. HI-507-RR/1, 2, 3
Contract OCD PS64 116, Task 4211B

Unclassified report

See also AD-617 111.

Descriptors: (*Shelters, Underground structures), (*Underground structures, Shelters), Civil defense systems, Tables.

Detailed listing of mines and caves located by the National Fallout Shelter Survey, and detailed listing and locations of vehicular tunnels. This data is intended for possible use in more specific studies of shelter potential in mines, caves, and tunnels.

AD-617 113 Div. 18/1, 32/9
CFSTI Prices: HC$3.00 MF$0.75

Hudson Inst., Harmon-on-Hudson, N. Y.
POPULATION DENSITY IN THE UNITED STATES URBANIZED AREAS.
Final research rept.,
by William M. Brown and Pauline Gutelle. 22 Mar 65, 54p Rept. no. HI-495-RR
Contract OCD PS64 116, Task 4211B

Unclassified report

Descriptors: (*Population, Urban areas), (*Urban areas, United States), (*Shelters, Civil defense systems), Density, Costs, Tables, Mathematical models.

Optimizing the design of a blast shelter program based on the principle of a balanced defense requires a fairly accurate knowledge of the distribution of the population density in the urbanized areas on a micro-scale, using areas as small as one mile. Using the census tract data made available by the Census Bureau and the Office of Civil Defense, this paper develops a model of the micro-population density distribution throughout the urbanized areas of the United States. Our results are based on (1) a detailed examination of the five largest central cities, (2) a combination of the micro-examination and statistics for the other 208 central cities, and (3) a crude sub-model for the urban fringe areas. The main results of our calculations show first the number of people (1960) in each of the selected density categories, and second, the national cost of providing blast shelters for them close to their residences. (Author)

16. Missile Technology

AD-616 567 Div. 12/3
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
CELESTIAL FRONTIERS,
by George H. Clement. 23 Mar 60, 20p
Rept. no. P-1915
Unclassified report

Prepared for presentation at the joint annual meeting of the American Congress on Surveying and Mapping and the American Society of Photogrammetry, Washington, D. C. 23 Mar 60.
Available copy will not permit fully legible reproduction Reproduction will be made if requested by users of DDC Copy is available for public sale.

Descriptors: (*Space probes, Launch vehicles(Aerospace), (*Launch vehicles(Aerospace), Space probes), Space probes, Satellites(Artificial), Research program administration.

AD-616 603 Div. 12/1
CFSTI Prices: HC$2.00 MF$0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THREE EXPERIMENTAL METHODS OF DETERMINING DYNAMIC RESPONSE CHARACTERISTICS OF MISSILE STRUCTURES,
by R. E. Blake and V. R. Paul. Aug 58, 32p
LMSD-2955
Unclassified report

Descriptors: (*Structures, Guided missiles), (*Guided missiles, Structures), Dynamics, Test methods.

Three methods of measuring mechanical impedance in missile structures are discussed: (1) application of a sinusoidal force, (2) application of an impulse, and (3) application of a random force. Equations which may be used to estimate the magnitude of response vibrations are presented. The effects of text fixtures, sinusoidal sweep rates, and other special problems associated with each of the methods are also discussed. In the concluding pages, the advantages and drawbacks of each of the methods are compared. (Author)

AD-616 672 Div. 12/3

RAND Corp., Santa Monica, Calif.
OPTIMIZING A PRELAUNCH CHECKOUT,
by Sidney I. Firstman and Bernard J. Voosen.
22 Jun 60, 24p Rept. no. P-1997
Unclassified report

Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Guided missiles, Checkout procedures), (*Checkout procedures, Optimization), Statistical analysis, Design, Engineering, Reliability.

This paper addresses the problem of making design decisions for time-limited checkouts of ballistic missiles and develops (a) quantitative criteria for the value of inclusion of individual checks in the checkout, (b) an expression for the required efficiency of the checkout equipment, and (c) a mathematical method for determining the content of a theoretically optimum checkout. A brief example is included. The method developed can also be used to ascertain the launch confidence of existing systems.

AD-616 746 Div. 12/5, 14/6, 14/8
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN EXPERIMENTAL DETERMINATION OF ULTRASONIC LONGITUDINAL WAVE VELOCITIES THROUGH NOSE CONE MATERIALS AT SEVERAL TEMPERATURES AS A FUNCTION OF LAMINATION ANGLE.
Master's thesis,
by Anton John Dorr. Jun 65, 72p Rept. no. GSP/PH/65-09
Unclassified report

Descriptors: (*Nose cones, Laminates), (*Laminates, Ultrasonic radiation), (*Ultrasonic radiation, Nose cones), Phenolic plastics, Nylon, Glass textiles, Velocity, Equations of state, Temperature.

Ultrasonic longitudinal wave velocities of nose cone materials were measured as a function of the lamination angle at several temperatures between 25C and 125C. Wave velocity at 3 Mc was obtained by measuring directly the transit time through a sample and dividing into the measured sample thickness. A maximum wave velocity uncertainty of 1.5% was obtained. It was found that the longitudinal wave velocity vs lamination angle curve maintains the same shape (for a given material) for temperatures between 25C and 125C. Furthermore, it was found that the wave velocity vs lamination angle curve can be predicted to within 2 1/2% by an empirical equation involving only the lamination angle; c(0 degrees), the measured wave velocity at an angle of 0 degrees; and c(90 degrees), the measured wave velocity at an angle of 90 degrees. Finally, it was found that the longitudinal wave velocity of certain materials varies as much as 25% between lamination angles of 0 degrees and 90 degrees, while other materials show less or no variation at all. (Author)

AD-616 774 Div. 12/3
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
AIRBORNE RADIO BEACON FOR GROUND-IMPACT RECOVERY OPERATIONS.
Terminal rept.,
by James M. Meek and David T. Lokerson. 7 Apr 65, 41p Rept. no. TM-65-15
Projs. 1A250206D240, 50900 Unclassified report

Descriptors: (*Radio beacons, Ordnance locators), (*Ordnance locators, Radio beacons), Rockets, Recovery, Position finding, Salvage, Impact prediction, Radio transmitters, Very high frequency, Guided missile tracking systems.

A beacon system was designed and tested for use in recovering rockets and data stored therein. A miniature radio beacon is carried aloft with the rocket and ejected just before rocket impact. The beacon capsule impacts near the rocket, erects an antenna, and transmits a direction-finding signal at 242.00 Mc±0.005 percent for an estimated 10- to 16-hr period. Tests show that the beacon can withstand rugged flight environment, including high-speed release from altitudes exceeding 1000 ft above ground and subsequent 4000-g impact against rocky terrain. Theoretical aerodynamic and ground-impact investigations were performed, simulated flight and impact tests were conducted, and numerous electronic and mechanical instruments were developed. (Author)

AD-616 885 Div. 12/3, 1/4
CFSTI Prices: HC$2.00 MF$0.50

Aerospace Corp., El Segundo, Calif.

PERFORMANCE AND CHARACTERISTICS OF 67.2 FT EXTENDED SKIRT CANOPY PARACHUTE WITH SINGLE CONICAL EXTENSION,
by Heinrich K. Epple. 1 Apr 65, 28p
Rept. no. TDR-469(5110-01)-2
Contract AF04 695 469
SSD TDR-65-42

Unclassified report

Descriptors: (*Parachutes, Aerial pickup systems), Performance(Engineering), Conical bodies, Aerodynamic characteristics, Payload, Drop testing, Recovery, Stability, Drag.

The details and results of two parachute drop tests made at El Centro, California, on 22 October 1964, are discussed. The parachutes were a modification of a basic design to permit the aerial recovery of payloads up to approximately 1500 pounds. Discussions and conclusions pertaining to the dynamic performance of these modified parachutes during descent and their physical condition after engagement with the aircraft retrieval system hardware are included. (Author)

AD-616 993 Div. 12/1
CFSTI Prices: HC$3.00 MF$0.75

General Electric Co., Philadelphia, Pa. Missiles and Space Div.
ORBIT INJECTION ERROR ANALYSIS.
Final rept.,
by L. E. Beardslee. 1964, 55p
Contract AF19 628 500 Unclassified report

Descriptors: (*Rocket trajectories, Errors), (*Rocket cases, Analysis), Temperature, Inertia, Thrust, Tables, Tolerances(Mechanics), Orbital trajectories.

In the study, offsets, products of inertia, tip-off errors, and nominal spin rate were varied to find the relative importance of each on the accuracy of the mission. Since no requirements have been placed on maximum or minimum apogee altitude acquired from the final initial conditions agreed upon, a parametric study was made showing the relative effect of varying each parameter. Assumptions have led to suggested tolerances on the controlled parameter.

17. Navigation, Communications, Detection, and Countermeasures

AD-616 440 Div. 6/6, 8/3

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MATCHED-FILTER THEORY FOR HIGH-VELOCITY ACCELERATING TARGETS,
by E. J. Kelly and R. P. Wishner. 23 Jul 64, 15p
Unclassified report

Pub. in IEEE Transactions on Military Electronics vMIL9 n1 p56-69 Jan 1965(Copies not available to DDC or Clearinghouse customers).
Operated with support from the U. S. Air Force.

Descriptors: (*Radar targets, Acceleration), (*Matched filters, Radar targets), Data processing systems, Radar clutter, Range finding, Broadband.

Two modifications of the conventional radar theory of matched filters and ambiguity functions are discussed. The first modification is to make the theory valid for high-velocity targets and wide-band signals, and the second is to include the effects of acceleration. The ability of a radar to measure target acceleration has previously been discussed in terms of measurement accuracy for isolated targets. This paper is concerned with the form of data processing necessary for the measurement and with the effects of acceleration on the clutter problem. (Author)

AD-616 447 Div. 6/6, 8/3

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADAR FREQUENCY MODULATIONS FOR ACCELERATING TARGETS UNDER A BANDWIDTH CONSTRAINT,
by Fred C. Schweppe. 17 Jun 64, 8p Unclassified report

Pub. in IEEE Transactions on Military Electronics vMIL9 n1 p25-32 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radar targets, Acceleration), (*Frequency modulation, Range finding), (*Range finding, Radar targets), Noise(Radar), Signal-to-noise ratio, Matched filters, Optimization, Matrix algebra.

An optimum frequency modulation for estimating the range, range rate, and range acceleration of a moving target is derived. The criterion of optimality is based on the estimate variances which are evaluated under the following assumptions: (1) additive white Gaussian observation noise, (2) high signal-to-noise ratio, (3) maximum-likelihood processing (matched filters), (4) RF phase used only for the range rate and range acceleration, and (5) carrier frequency much larger than the signal bandwidth. The choice of frequency modulation is constrained by the bandwidth of the transmitted signal. A large time-bandwidth product is assumed. The optimum frequency modulation consists of three appropriately placed frequency jumps between the limits imposed by the bandwidth constraint. This optimum modulation is compared with a third degree, power law modulation. The derivation of the optimum, originally done using Pontryagin's Maximum Principle, leads to the following very simple design principle; the optimum modulation is orthogonal to the target's motion. (Author)

AD-616 499 Div. 12/2
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
DESIGN AND OPERATION OF GROUND GUIDANCE SYSTEMS,
by Donald E. Lewis. 7 Jan 60, 49p Rept. no. P-1874
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Guidance, Guided missiles(Surface-to-surface)), (*Guided missiles(Surface-to-surface), Guidance), Design, Operation, Radar equipment, Inertial guidance, Terminal guidance, Midcourse guidance.

AD-616 515 Div. 5/2
CFSTI Prices: HC$2.00 MF$0.50

Radio Corp. of America, Cambridge, Ohio.
Communications Systems Div.
CW APPLIQUE TO FM PACK RADIO SETS.
Final engineering rept. for 22 Jun 64-31 Mar 65,
by R. Bigler. 31 Mar 65, 48p Rept. no. CR-65-589-4
Contract DA28 043AMC00217E, Proj. 1G6 41209D535 12 01
Unclassified report

Descriptors: (*Transmitter-receivers, Frequency modulation), (*Pulse communication systems, Transmitter-receivers), Design, Voice communication systems, Radio signals, Radiofrequency power, Portable, Radio equipment.

A study was conducted and a design selected for the fabrication of exploratory, developmental model applique units that provide a Morse-Code capability for pack radio sets. The units constructed were designed for use with Radio Set AN/PRC-10 and Radio Set AN/PRC-25, and do provide a manual Morse-Code transmission and reception capability. Signal strengths of 10 to 12 db below the minimum required for voice transmission provided satisfactory code reception. This is equivalent to nearly a 2:1 increase in range. The study also resulted in the identification of suitable techniques for high-speed Morse-Code transmissions. The development of this capability was not required by the present contract. (Author)

AD-616 578 Div. 5/5, 5/2, 5/4
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
WIRELINE DATA TRANSMISSION,
by Carroll R. Lindholm. 7 Mar 60, 17p
Rept. no. P-1931
Unclassified report

Prepared for presentation before the Institute of Radio Engineers Professional Group on Communications Systems, Los Angeles Chapter, 8 December 1959
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.
Copy is available for public sale.

Descriptors: (*Data transmission systems, Digital systems), (*Telephone communication systems, Digital systems), Voice communication systems, Communication theory, Amplitude modulation, Phase modulation, Frequency modulation, Nonlinear systems, Coding, Feedback.

A general review of high speed data transmission over common carrier voice channel facilities is presented. Many of the problems arising due to the special nature of the medium are considered and result in recommendations for future data transmission systems. A

few specific illustrative systems are discussed to indicate trends in system design. Relevant developments are also reported, as well as areas seemingly worthy of considerable further development. (Author)

AD-616 600 Div. 5/1, 28/3
CFSTI Prices: HC$2.00 MF$0.50

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
CONSPICUITY CODING OF UPDATED SYMBOLIC INFORMATION,
by Frank L. Vicino, Robert S. Andrews, and Seymour Ringel. May 65, 44p Technical research note no. TRN-152
Proj. 2J024701A723 Unclassified report

Descriptors: (*Combat information centers, Display systems), (*Display systems, Effectiveness), Visual perception, Command + control systems, Psychophysiology.

The study is concerned with (1) the degree to which extraction and assimilation of information is affected by the amount of information presented in a slide and by the type and extent of change introduced in updating, and (2) the extent to which performance can be improved through various enhancement techniques such as coding updates for conspicuity or providing hard copy history--showing the situation before updating--for comparison with updated slides. If the extent of improvement to be attained by such techniques is known, the value of such improvement can be balanced against the cost of providing such aids. Specific objectives were: (1) To determine the separate and interactive effects on speed and accuracy of information extraction and assimilation of (a) three different amounts of information presented, (b) three types of updating change, and (c) three extents of updating change. (2) To determine the extent to which performance under the experimental conditions imposed can be enhanced by either of two methods of coding updates and by provision of hard copy.

AD-616 671 Div. 5/2, 5/5, 8/2
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
RELIABLE DIGITAL COMMUNICATIONS SYSTEMS USING UNRELIABLE NETWORK REPEATER NODES,
by Paul Baran. 27 May 60, 27p Rept. no. P-1995
Unclassified report

Descriptors: (*Communication systems, Redundant components), (*Optimization, Redundant components), Damage, Reliability(Electronics), Relays, Data transmission systems, Networks, Probability, Monte Carlo method.

A communications network that utilizes a moderate degree of redundancy to provide high immunity from the deleterious effects of damage of relay centers is described. The degree of redundancy needed is shown to be determined primarily by the amount of damage expected. Curves indicating the optimum degree of redundancy are shown and the distribution of performance under different damage patterns described. The redundancy desired is shown to vary as a function of the station position in the network, the stations at the fringe of the network requiring more redundancy than the inside stations. (Author)

AD-616 678 Div. 5/5
CFSTI Prices: HC$3.00 MF$0.75

Mitre Corp., Bedford, Mass.
ERROR CONTROL FOR DIGITAL DATA TRANSMISSION OVER TELEPHONE NETWORKS,
by Daniel R. O'Neil. May 65, 56p
Rept. no. TM-04113
Contract AF19 628 2390, Proj. 456 1
ESD TR-65-87
Unclassified report

Descriptors: (*Data transmission systems, Errors), (*Telephone communication systems, Errors), Digital systems, Control systems, Coding.

The results are presented of a study of error control techniques applicable to binary digital data transmission over commercial telephone networks. The investigation consisted of a study of error control algorithms, a compilation of the error statistics for digital data on telephone lines, an evaluation of the performance of the error control techniques when applied to these error statistics, and a survey of the state-of-the-art in the hardware development of error control devices. The performance to be expected from these error control algorithms was determined when applied to the actual error statistics of common carrier voice bandwidth communication channels and the feasibility of implementing these techniques. An introduction to the important considerations for selection and evaluation of error control techniques is provided. (Author)

AD-616 700 Div. 6/6, 8/7
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
DETECTION OF RADAR ECHOES IN NOISE REVISITED.
Memo.,
by P. Swerling. May 65, 81p Rept. no. RM-4586-PR
Contract AF49 638 700
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Radar echo areas, Detection), (*Detection, Radar echo areas), (*Noise(Radar), Detection), Radar signals, Radar pulses, Probability, Signal-to-noise ratio.

Techniques are extended for maximum likelihood detection procedures for radar detection in the presence of unknown parameters (given by Kelley, Reed, and Root). The analysis is applied to cases where the detection processes still belong to the class of maximum-likelihood procedures but where the actual waveform, or noise covariance, or both, may differ from those for which the detection procedure would be maximum likelihood. The analysis covers detection procedures ranging from fully coherent, through partially coherent, to pulse-to-pulse incoherent cases. (Author)

AD-616 701 Div. 6/6, 12/1, 20/2
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
SATELLITE-BASED DETECTION OF THE ELECTROMAGNETIC SIGNAL FROM LOW AND INTERMEDIATE ALTITUDE NUCLEAR EXPLOSIONS.
Memo.,
by William J. Karzas and Richard Latter. Jun 65, 13p Rept. no. RM-4542
Contract AF49 657 9619SA3
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Nuclear explosions, Detection),

(*Reconnaissance satellites, Nuclear explosion), (*Electromagnetic waves, Nuclear explosions), (*Detection, Electromagnetic waves), Signals, Ionospheric propagation, Radiofrequency interference, High frequency.

A theoretical examination of satellite-based detection of electromagnetic signals produced by nuclear explosions at low and intermediate altitudes (a few to 20 or so kms). Since such explosions are particularly difficult to detect, the Memorandum suggests that this promising detection technique be included in the Project VELA satellite. (Author)

AD-616 835 Div. 6/1, 25/1

Navy Underwater Sound Reference Lab., Orlando, Fla.
DIFFRACTION CONSTANTS OF TRANSDUCERS.
Research rept.,
by Robert J. Bobber. 4 Dec 64, 6p
Rept. no. USRL-RR-79
Unclassified report

Pub. in Journal of Acoustical Society of America v37 n4 p591-5 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Transducers, Sound transmission), (*Sound transmission, Transducers), Diffraction, Sound, Underwater sound, Hydrophones, Microphones, Propagation.

The concept of a transducer diffraction constant as the ratio of the blocked diaphragm pressure to the incident free-field pressure is examined for meaning, definition, and application in the general case. The concept is extended to a transmitting transducer, and a transmitting diffraction constant that is equal in value but reciprocal in concept to the conventional or receiving constant is developed from the acoustical reciprocity theorem. The relationship among the diffraction constant D, the radiation resistance R, and the directivity factor delta is given as D squared=R delta/R sub O, where R sub O is the radiation resistance of a simple source. The electrical analog of the diffraction constant D is found to be an ideal transformer with the turns ratio D:1. The electrical analog of a complete and reciprocal projector-medium-hydrophone system is presented. (Author)

AD-616 983 Div. 6/6, 8/2
CFSTI Prices: HC$1.00 MF$0.50

Navy Electronics Lab., San Diego, Calif.
NEL DIGITAL TYPE RADAR RANGE UNIT.
Research and development rept. for Mar 55-Nov 58,
by J. S. Anderson. 15 Jan 59, 16p
Rept. no. NEL-887 Unclassified report

Descriptors: (*Radar equipment, Range finding), Delay circuits, Digital systems, Counting methods, Oscillators, Time interval counters.

A radar range unit using digital circuitry of the type employed in electronic counters was constructed and operated with radar sets in three trial installations. Results showed that the digital unit is feasible, is capable of greater accuracy and higher rates of measurement than conventional units, and provides range information directly available for use in navigational computers. (Author)

AD-617 002 Div. 6/6
CFSTI Prices: HC$2.00 MF$0.50

Antenna Lab., Ohio State Univ., Research Foundation, Columbus.

DOPPLER AND MONOPULSE TRACKING RECEIVERS FOR THE ADAPTIVELY PHASED ARRAY. VOLUME I. DIFFERENTIAL DOPPLER.
Interim rept. for Oct 63-Sep 64,
by Charles Brenner and James Tourdot. May 65, 27p
Contract AF30 602 2166, Proj. 4519, Task 451901
RADC TR-65-66 V1
Unclassified report

See also AD-617 080.

Descriptors: (*Radar receivers, Monopulse radar), (*Phased arrays, Doppler effect), (*Doppler effect, Phased arrays), (*Radar antennas, Doppler effect), Frequency shift, Phase(Electronics), Doppler radar, Radar tracking, Transformations(Mathematics), Mathematical analysis.

The report presents an analysis of the effect of differential doppler on an array of two elements (Vol. I) and an analysis of a monopulse tracking receiver (Vol. II). The results of the differential doppler analysis are presented as a series of graphs providing an insight into the magnitude of this effect and its rate of change. The monopulse receiver analysis includes a detailed discussion of its performance in the presence of noise. (Author)

AD-617 069 Div. 6/5
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
PROPERTIES OF AN ACTIVE OPTICAL SYSTEM,
by Robert G. Humphrey. 30 Apr 65, 37p
Rept. no. TR-1281
Projs. 1P222901A207, 36100
Unclassified report

Descriptors: (*Optical equipment, Detection), (*Detection, Optical equipment), Optical scanning, Infrared optical systems, Sensitivity, Fog, Clouds, Infrared radiation, Scattering.

An active optical configuration is described that permits high-precision detection of targets at a predetermined range. Sources of high radiance are required and the degree of range precision obtainable depends on the availability of high performance components. The detection system has a limited range of sensitivity in the region where target detection is required. By making this range of sensitivity small, the system can be made insensitive to natural fog and clouds for short range applications. A geometric analysis is made of the system's clear weather performance. Additional analysis indicates performance in fog. Some applications are suggested. (Author)

AD-617 080 Div. 6/6
CFSTI Prices: HC$2.00 MF$0.50

Rome Air Development Center, Griffiss AFB, N. Y.
DOPPLER AND MONOPULSE TRACKING RECEIVERS FOR THE ADAPTIVELY PHASED ARRAY. VOLUME II. AN ANALYSIS OF A MONOPULSE TRACKING RECEIVER,
by James Tourdot. May 65, 47p
Rept. no. RADC TR-65-66, vol. 2
Unclassified report

See also AD-617 002.

Descriptors: (*Radar receivers, Monopulse radar), (*Phased arrays, Radar antennas), Narrowband, Radar tracking, Errors, Phase(Electronics), Noise(Radar), Signal-to-noise radio, Phase detectors, Performance-(Engineering), Circuits, Antenna radiation patterns, Antenna feeds, Graphics, Gain, Correlation techniques, Doppler radar, Mathematical analysis.

The paper describes a simple method of obtaining the tracking information. The system operation is discussed and some of its advantages are pointed out. Since monopulse receivers are often required to provide tracking errors for very low input signal levels, it is desirable to understand their performance in the presence of noise of appreciable level compared to the signal. A detailed noise analysis is given that will provide some insight into this problem. The general results derived have application also in other systems, for instance in radiometer studies. (Author)

AD-617 116 Div. 6/6, 12/2
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
TELEMETRY FOR A GUN-LAUNCHED ORBITING VEHICLE-MARTLET IV,
by Frank Vrataric and Joseph P. Casey.

28 May 65, 30p Rept. no. TM-65-30
Projs. DA1V14501B53A, 55000

Unclassified report

Descriptors: (*Telemeter systems, Boost-glide vehicles), (*Gun launched, Boost-glide vehicles), Orbital trajectories, Telemetering transmitters, Telemetering receivers, Noise(Radio), Frequency modulation, Control systems, Rockets.

Telemetry systems designed for gun-launched vehicles are electronically primitive compared with modern missile TM systems; however, recent developments in packaging techniques for electronic components have advanced the state of the art to enable the design of sophisticated TM systems for use in high-g environments. In addition, recent successes in the U.S. Army's HARP (High Altitude Research Probe) project have led to a proposal, by the Space Research Institute of McGill University, to place a satellite into orbit via a gun-launched three-stage rocket. The considerations leading to a proposed TM system to measure the various parameters of the orbital injection control system are described. (Author)

18. Nuclear Science and Technology

AD-616 514 Div. 20/4, 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE SEPARATION OF URANIUM ISOTOPES BY GASEOUS DIFFUSION: A LINEAR PROGRAMMING MODEL,
by D. M. Fort. 2 Feb 60, 15p Rept. no. P-1899
Unclassified report

Prepared for presentation at the International Conference on Operational Research (2nd), Aix-En-Provence, France, Sep 60
Available copy will not permit fully legible reproduction
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Descriptors: (*Uranium, Isotope separation), (*Gaseous diffusion separation, Linear programming), (*Linear programming, Gaseous diffusion separation), Mathematical models, Gas flow, Nuclear reactors, Operations research.

The model depicted concerns an idealized version of the gaseous diffusion process in steady-state operation. Three types of relations are taken into account: (a) material balance within the plant, (b) the scale of plant required to generate given material flows, and (c) the irreversible nature of the gaseous diffusion process. The principal intended contribution of this paper is in suggesting the importance of the last consideration in certain applications, and in describing a way to handle it via linear programming. (Author)

AD-616 521 Div. 20/6, 13/4, 15/1
CFSTI Prices: HC$3.00 MF$0.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
MONTE CARLO CALCULATION OF NEUTRON STREAMING THROUGH TWO-LEGGED-DUCT ENTRANCEWAYS.
Final rept. for Jun-Dec 64,
by Leonard B. Gardner and Alan J. Mettler. Jun 65, 92p Technical rept. R-379
Projs. Y F008 08 05 201, DASA11 026
Unclassified report

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Descriptors: (*Shelters, Dose rate), (*Ducts, Neutron flux), (*Neutron flux, Monte Carlo method), (*Monte Carlo method, Neutron flux), Neutron spectrum, Prompt neutrons, Albedo, Numerical analysis, Programming computers, Neutron transport theory, Dosimeters.

Several techniques for calculating dose rates in the study of shelter entranceways are reported. Calculations were verified by experiments. These calculations also determine neutron energy spectra, a parameter that is difficult to measure and which is very useful in gaining insight into the design of protective structures. Both the neutron flux spectra and dose rates are calculated for various positions along the centerline of a two-legged duct. Calculations were performed utilizing the ADONIS computer code which solves the Neumann approximation to the transport equation by Monte Carlo techniques. These Monte Carlo calculations were compared to second-leg calculations utilizing a semiempirical albedo formula, and were also compared to experimental measurements made with a tissue equivalent dosimeter. Included is a discussion of UNIGEOM, a generalized computer program for ADONIS geometry, designed to be run on the IBM 7094. (Author)

AD-616 529 Div. 20/6, 16/10

Federal Radiation Council, Washington, D. C.
BACKGROUND MATERIAL FOR THE DEVELOPMENT OF RADIATION PROTECTION STANDARDS. PROTECTIVE ACTION GUIDES FOR STRONTIUM-89, STRONTIUM-90, AND CESIUM-137.
May 65, 53p Rept. no. R-7
Unclassified report

Available from Superintendent of Documents, GPO, Washington, D. C., 20402, as Y3.F31/17:8/7, HC $0.30.
Available from CFSTI, MF $0.75.

Descriptors: (*Radiological contamination, Standards), (*Strontium, Radiological contamination), (*Cesium, Radiological contamination), Radiation hazards, Radioactive isotopes, Radioactive fallout, Radiation sickness, Food, Dose rate, Reactor accidents, Arctic regions, Ecology.

The report provides information and guidance for actions appropriate to situations involving contamination of the environment by the radionuclides strontium-89, strontium-90, and cecium-137. Two conditions of environmental contamination were examined: an acute localized contaminating event in which prompt action may be necessary to avoid the exposure that would otherwise result; and a widespread, generally increasing, low-level of contamination (from stratospheric fallout) that causes a continuous intake of radioactive materials by large numbers of people for a period of years. Special consideration was given to the situation in the arctic region where, because of unusual ecological conditions and food chains, some population groups are exposed to levels higher than those in other parts of the United States. (Author)

AD-616 613 Div. 20/6, 20/3
CFSTI Prices: HC$2.00 MF$0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
AN ABSOLUTE MEASUREMENT OF THERMAL NEUTRON ALBEDO FOR SEVERAL MATERIALS.
Rept. for Oct 64-Feb 65,
by Duane R. Doty. May 65, 28p
Technical rept. no. R-377
Task Y F008 08 05 201
DASA 11.026
Unclassified report

Descriptors: (*Thermal neutrons, Albedo), (*Albedo, Thermal neutrons), (*Shielding, Thermal neutrons), Neutron scattering, Shelters, Lead, Iron, Aluminum, Carbon, Concrete, Thickness.

Albedo is a concept which has proved useful in the calculation of the penetration of nuclear weapons radiation through a shelter entranceway. The application of the albedo approach to describe the behavior of neutrons impinging upon various materials is the subject of this report. Values of thermal neutron albedo for lead, iron, paraffin, aluminum, carbon, and high-density concrete were measured, using the nuclear reactor of the University of California at Los Angeles. The results are in reasonable agreement with theoretical calculations. Verification of the angular dependence of neutron scattering was attempted, but with only partial success. Albedo as a function of thickness of the scattering material was measured for paraffin, carbon, and aluminum. The results essentially

conform with theory. The possibility of using a simple empirical formula for albedo calculations of thermal-neutron streaming through shelter ducts is apparent. (Author)

AD-616 703 Div. 20/6, 20/3
CFSTI Prices: HC$5.00 MF$1.25

Air Force Weapons Lab., Kirtland AFB, N Mex.
PROTON ABSORPTION IN DOSE-EQUATED MATERIALS.
Technical rept. for 1 Sep-1 Dec 64,
by Joseph F. Janni. Apr 65, 188p WL-TR-65-3
Proj. 8803

Unclassified report

Descriptors: (*Protons, Absorption), (*Tissues-(Biology), Dosage), (*Bone, Dosage), (*Dosimeters, Materials), Proton reactions, Ionization, Muscles, Radiation measurement systems, Dose rate, Tables.

The report presents theoretically calculated values of the ionization interaction for protons in numerous materials and compares these values with those of tissue and bone. This was done so that possible dosimetric media may be compared and evaluated for 'dose equivalency.' Results for the linear energy transfer are included. The proton energies are considered from .5 Mev to 1000 Mev. The K and L shell effects upon the stopping power equation are included. The calculation approach and the resultant tabulations are presented in detail for over seventy different materials. (Author)

AD-616 720 Div. 20/6
CFSTI Prices: HC$3.00 MF$0.75

Texas A. and M. Univ., College Station.
DEVELOPMENT OF LARGE FLOW COUNTERS FOR DETECTION OF LOW INTENSITY COSMIC RAY PARTICLES.
Master's thesis,
by Kenneth Winson Bull. May 65, 71p
Contract AF33 608 1120

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Cosmic rays, Monitors), (*Geiger counters, Cosmic rays), Design, Performance(Engineering), Gas flow, Pressure, Volume.

The successful design of several types of large flow counters which should be quite useful in the detection of cosmic ray particles is reported. These counters can be combined to form large sensitive volumes which are efficient and reliable and which are simple and economical to construct and maintain. (Author)

AD-616 773 Div. 20/6
CFSTI Prices: HC$4.00 MF$1.00

Air Force Weapons Lab., Kirtland AFB, N. Mex.
X-RAY ABSORPTION IN DOSE-EQUATED MATERIALS.
Technical rept. for 1 Jan-1 Jun 64,
by Benton C. Clark and Joseph F. Janni. May 65,
149p WL TR-64-134
Proj. 8803

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*X-ray absorption analysis, Materials), (*Materials, X-ray absorption analysis), Tables, Attenuation, Absorption, Bone, Muscles, Chemical elements, Plastics, Gases, Silicon, Silver compounds, Bromides, Gamma rays, Photons, Radiological dosage.

The calculated values and comparisons of X-ray interaction parameters for a number of materials are presented so that possible dosimetric media may be directly compared and evaluated with several selected radiation effects media. The photon energies considered range from 0.01 Mev to 100 Mev. The calculational approach as well as the resultant tabulations are presented in detail. (Author)

AD-616 776 Div. 20/5, 7/4
CFSTI Prices: HC$4.00 MF$1.00

Air Force Weapons Lab., Kirtland AFB, N. Mex.
PM-1 ANNUAL SUMMARY REPORT, 1 NOVEMBER 1962-31 OCTOBER 1963.
Technical rept. for Aug 63-Nov 64,
by James T. Westermeier. May 65, 128p
WL TR-65-54
Proj. 2800, Task 280001

Unclassified report

Descriptors: (*Pressurized water reactors, Operation), (*Nuclear power plants, Operation), Performance(Engineering), Costs, Site selection, Construction, Reactor cores, Health physics, Maintenance, Safety, Chemistry.

The report presents an evaluation of the PM-1 nuclear power plant operation during the first year of Air Force operation, 1 November 1962 to 31 October 1963. The data utilized were gathered from the 731st Radar Squadron PM-1 Monthly Summary Reports, work orders, plant logs, and supply requests, as well as during the course of periodic visits to the site. All phases of the plant operation were evaluated, insofar as available data permitted, and specific recommendations on various facets of the plant operation are made. (Author)

AD-616 862 Div. 20/6

Defence Research Board, Ottawa (Ontario).
PROTECTION AGAINST FALLOUT RADIOACTIVITY,
by E. E. Massey. 1958, 3p

Unclassified report

Pub. in Canadian Textile Journal p1-3 May 16 1958
(Copies available only to DDC users).
Rept. presented at the annual meeting of the Canadian Association of Textile Colourists and Chemists, Quebec Section (22nd), Montreal, Quebec, 18 Apr 1958.

Descriptors: (*Radioactive fallout, Shielding), (*Shielding, Radioactive fallout), Canada, Textiles, Buildings, Shelters, Gamma rays.

AD-617 032 Div. 20/6

Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
DECISION-MAKING SPARK CHAMBERS,
by Ch. Rey. S. Parker, B. Sherwood, and D. Schwartz.
23 Jul 64, 7p Unclassified report
Pub. in Nuclear Instruments and Methods v32 p217-23

1965 (Copies available only to DDC users).

Descriptors: (*Radiation measurement systems, Computer logic), (*Computer logic, Radiation measurement systems), Wiring diagrams, Data processing systems, Magnetic cores, Trigger circuits, Pulse analyzers, Servomechanisms, Nuclear physics.

A wire spark chamber was developed in which information can be analyzed within 30 to 50 nsec of the spark time and used to trigger other spark chambers for a more detailed analysis of the same event. The wire chamber system has good spatial resolution, very low mass, a recovery time of less than 1 msec and a fast, low impedance output capable of driving versatile core arrays. By running the wires in simple patterns through core arrays, it is possible to get signals whose pulse height is proportional to such things as the number of sparks, the number with more than some minimum separation, the position of a spark and the separation of two sparks. Many other kinds of spatial decisions can be made with these devices such as the recognition of scattering of a particle and coplanarity of two particles. Decision-making spark chambers are used to trigger an optical spark chamber of two track events. Wires were grouped together at the outputs to give 1 cm spatial resolution. The observed single track efficiency for one gap was greater than 99% and the double track efficiency was greater than 97%. (Author)

AD-617 098 Div. 20/6
CFSTI Prices: HC$4.00 MF$0.75

Foreign Technology Div., Wright-Patterson AFB, Ohio.
INSTRUMENTS AND METHODS OF RADIATION ANALYSIS (COLLECTION OF ARTICLES),
ed. by E. L. Stolyarova. 4 Mar 65, 102p
FTD-MT-64-179
TT 65-62532
Unclassified report

Pribory i Metody Analiza Izluchenii edited machine trans. of Inzhenerno-Fizicheskii Institut. Sbornik Nauchnykh Rabot (USSR) v3 p1-192 1962.
Another trans. is available from CFSTI $3.00 as AD-600 767, BUSHIPS-Trans-841.
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Descriptors: (*Radiation measurement systems, Health physics instrumentation), Gamma counters, Scintillation counters, Ionization chambers, Dosimeters, Neutron counters, Photomultipliers, Shielding, Fast neutrons, Gamma-ray spectra, Spectrum analyzers, Beta-ray spectrum, Electron accelerators, Bremsstrahlung, USSR.

Contents: Spectral-angular distributions of scattered gamma radiations in protective barriers, Angular and energy distributions of gamma rays Co60, Scattered in a heterogeneous medium of Al + Pb, Sensitivity single-crystal scintillation gamma spectrometer, Dependence of build-up factors on location of protective barrier between source and detector, Nonlinear gradient programming for calculation of minimum weight shielding, Shielding from radiations of electron accelerators, Graphite ionization chamber for measurement of intensity of bremsstrahlung, Scintillation gamma dosimeter, Measurement of doses of fast neutrons, Threshold detectors for measurement of fluxes and spectra of fast neutrons, Physical bases of creation of high-efficiency detectors of fast neutrons, Cutoff of gamma background in high-efficiency detector of fast neutrons photomultiplier for separation of pulses from fast neutrons and gamma quanta.

AD-617 143 Div. 20/6
CFSTI Prices: HC$3.00 MF$0.75

Stanford Research Inst., Menlo Park, Calif.
CENIZA-ARENA CLEANUP IN SAN JOSE, COSTA RICA: OPERATIONAL ASPECTS AS RELATED TO NUCLEAR WEAPON FALLOUT DECONTAMINATION,
by Donald E. Clark, Jr. and Hong Lee.
May 65, 63p
Contract N228 62479 65421, Proj. MU5069, Task 3231C
Unclassified report

Descriptors: (*Disposal, Urban areas), (*Radiological contamination, Decontamination), (*Decontamination, Radioactive fallout), Costa Rica, Nuclear weapons, Volcanoes, Sanitary engineering, Tables, Roads, Cargo vehicles, Particles.

The continuing eruptions of Volcan Irazu and the consequent deposition of volcanic debris on the city of San Jose, Costa Rica, offered a unique opportunity to improve our understanding of the physical effects of fallout-like particles (ceniza-arena) deposited in urban areas. Detailed records of ceniza-arena deposition and removal from San Jose were tabulated and analyzed. The magnitude and problems of decontaminating a fallout contaminated city were illustrated (except for the complicacy of radiation) in the San Jose ceniza-arena cleanup operations. (Author)

AD-617 153 Div. 20/6, 20/2
CFSTI Prices: HC$2.00 MF$0.50

Air Force Special Weapons Center, Kirtland AFB, N. Mex.
CONTACT RADIATION HAZARD ASSOCIATED WITH CONTAMINATED AIRCRAFT,
by Paul M. Crumley, James L. Dick, Kermit C. Kaericher, William J. Nicholson, and James E. Banks.
11 Oct 57, 36p
Proj. 2 8a
WT 1122 Unclassified report
Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Radiological contamination, Aircraft), (*Health physics, Radiological contamination), (*Aircraft, Radiological contamination), Flight paths, Atomic clouds, Radiation hazards, Dose rate, Gamma counters, Correlation techniques, Nuclear explosions.

This project was conducted to determine whether there is a correlation between readings made with standard gamma survey meters and the effective contact radiation hazard associated with contaminated aircraft. Complete surveys of contaminated airplanes were made with the T1B, JUNO, and PDR-27c, and these readings were compared to surface dose rates taken with special instrumentation and photographic film which were prepared in such a way as to measure empirically the maximum radiation dose rate the most sensitive tissues of the human body would experience if contact were made between the body and the contaminated surfaces. Preliminary analysis of the data indicates that multiplication factors of 90 for the impingement surfaces and 40 for other surfaces applied to surface T1B gamma readings will give practical effective surface dose rates of total radiation on the areas of interest. Further studies involving the protective efficiency of gloves showed that a double pair of gloves, thin broadcloth over rubber surgical, provided the most practical hand covering. (Author)

AD-617 177 Div. 20/6, 18/1, 20/2
CFSTI Prices: HC$1.60 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.

EVALUATION OF A RADIOLOGICAL DEFENSE WARNING SYSTEM (PROJECT CLOUDBURST), by T. E. Petriken. 16 Aug 57, 14p
Proj. 6 1 1b
WT 1112 Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Radiation alarms, Civil defense systems), (*Nuclear warfare, Radiation alarms), (*Radiological warfare, Radiation alarms), Health physics, Underground structures, Radiation measurement systems, Nuclear weapons, Detonations, Performance(Engineering), Nuclear explosions.

A radiological defense warning system developed by the U. S. Army Signal Engineering Laboratories for the Corps of Engineers was evaluated by exposure to nuclear detonations. The system evaluated consisted of thermal, gamma, and blast pressure detectors. Stations were located in overpressure regions of 1 psi on early events and moved to greater distances on later shots. The results showed that, in the overpressure region for which it was designed, the warning system operated successfully. In addition, on Shots 5, 6, and 8 successful operation was obtained at distances much greater than required. It is recommended that further testing on a limited scale be effected to determine the suitability of this system for detection in the region of 1 psi for megaton-yield devices. (Author)

19. Ordnance

AD-616 729 Div. 3/5
CFSTI Prices: HC$2.00 MF$0.50

Naval Ammunition Depot, Crane, Ind.
EXPERIMENTAL HIGH INTENSITY FLARE SYSTEMS DATA REDUCTION AND ANALYSIS,
by Ralph Chipman. 17 May 65, 30p
Rept. no. RDTR-57
Unclassified report

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Descriptors: (*Flares, Brightness), Data, Analysis, Measurement, Burning, Light, Experimental data.

The data from the experimental high intensity flare systems was reduced to foot-candle, candlepower, and average candlepower measurements and was analyzed for significance. There was no large significant difference in candlepower shown between systems of flares. The horizontal multiple flare systems rated slightly higher in average candlepower than the vertical multiple flare systems. The candlepower was approximately directly proportional to the cross sectional area of the flare. There was good correlation between tunnel data and MAPI data for the Mk 24 Flares. The burning rates for all systems were about the same. (Author)

AD-616 969 Div. 22/6, 2/10

Suffield Experimental Station, Ralston (Alberta).
AIR-BLAST COUPLING TO PROGRADE AND RETROGRADE SURFACE WAVES.
Rev. ed.,
by G. H. S. Jones, G. T. Maureau, and S. A. Cyganik.
12 Jun 63, 10p
Proj. D89 16 01 05
Unclassified report

Pub. in Journal of Geophysical Research v68 n17 p4979-87 Sep 1 1963. Revision of manuscript submitted 18 Mar 63. (Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Airburst, Seismic waves), (*Seismic waves, Propagation), Seismographs, Stratigraphy, Mechanical waves, Shock waves, Surface burst, Underground explosions.

It is shown that on the Suffield test site surface-burst changes of TNT generate a dispersed surface wave directly in the ground, which may be either prograde or retrograde, and, at the same time, an approximately constant-frequency air-coupled wave. The phase relationship between the air-coupled wave and the dispersed wave is sensitive to slight changes in the dispersive properties of the layered mediums. Comparison is made with the prograde and retrograde pulses generated by buried charges, and the seismograms from the large charge series are supplemented by synthetic seismograms produced by adding the air-coupled train from small surface-burst charges to the dispersed train produced by small contained charges. (Author)

AD-616 988 Div. 22/1
CFSTI Prices: HC$3.00 MF$0.75

Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
ROTOR CREEP TEST OF FUZE, MT, T366.
Test rept.,
by W. E. Chandler. Mar 65, 56p
Rept. no. T65-11-1
Proj. 1W542718P384
Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Fuze functioning elements, Tests), (*Creep, Fuze functioning elements), Fuzes(Ordnance), Loading-(Mechanics), Temperature, Plastics, Life expectancy, Test methods, Test equipment, Mathematical analysis.

Tests were conducted to determine if the T366 fuze rotors (Fuze, MT, T366) could withstand storage temperatures under simulated loading conditions. Five 200-hour tests were conducted on these rotors which were subjected to loads of 8.25 lbs. and 16.5 lbs. at temperatures of -65F, +70F, +125F and +165F. Overall results of the tests indicate that the rotors will withstand prolonged exposure to temperatures of -60F and +165F and still function satisfactorily. (Author)

AD-617 095 Div. 22/8, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Rock Island Arsenal, Ill.
FATIGUE STRENGTH OF THREADED STEEL RODS.
Final technical rept. for Sep 63-Dec 64,
by Fred K. Blessin. May 65, 30p Rept. no. 65-1094
Proj. DA1F5 42712D376 04
Unclassified report

Descriptors: (*Steel, Screw threads), (*Rods, Fatigue-(Mechanics)), (*Fatigue(Mechanics), Screw threads), (*Recoil mechanisms, Rods), (*Screw threads, Fatigue-(Mechanics), Howitzers, Tests, Loading(Mechanics), Life expectancy, Experimental data.

An investigation was made to determine the fatigue strength of several types of threads suitable for use on 105 mm Howitzer Recoil Mechanism piston rods. Fatigue tests, which simulated the loading of the piston rods were conducted with 124 threaded specimens. The specimens were 1.125 and 1.250 inches diameter and had conventional UNF ground, large root radius UNJF ground, and large root radius UNJF rolled threads. Specimens of both sizes with large root radius rolled threads had an average of 34 percent greater fatigue strength than specimens with ground threads of the same profile. Specimens with large root radius ground threads had an average of 7 percent greater fatigue strength than those with conventional UNF ground threads. Considering all three types of threads, the 1.250 inch diameter specimens, with 27 percent more stress area, were only 9 percent stronger than the 1.125 inch diameter specimens. Limited tests at minus 65F showed that the fatigue strength of the specimens was greater at this temperature than at temperatures from 60 to 90 F. (Author)

AD-617 150 Div. 13/10, 22/6, 20/2
CFSTI Prices: HC$4.60 MF$0.75

Illinois Univ., Urbana.
BEHAVIOR OF UNDERGROUND STRUCTURES SUBJECTED TO AN UNDERGROUND EXPLOSION,
by G. K. Sinnamon, R. E. Woodring, N. M. Newmark, and F. Matsuda. 11 Oct 57, 54p
Contract DA49 129eng324, Proj. 3 3 2
WT 1126; PB 163 431 Unclassified report

Rept. on Operation TEAPOT, Nevada Test Site, Feb-May 55.
Declassified 11 Aug 61.

Descriptors: (*Underground structures, Underground explosions), (*Underground explosions, Underground structures), (*Nuclear explosion damage, Underground structures), Reinforced concrete, Test methods, Soil mechanics, Structural properties, Mathematical analysis, Structures, Soils, Stresses, Pressure.

Two buried reinforced concrete four-walled structures without floor or roof were tested, one at 200 feet and the other at 250 feet from a 1.2 kt device buried at a depth of 67 feet. The structures were instrumented to give transient load and response data. In addition, provisions were made to obtain data on permanent displacements and strains. The crater formed by the explosion was unexpectedly small, being 146 feet in radius, so that the two targets were approximately 50 and 100 feet from the edge of the crater. The structures responded primarily as rigid bodies and followed the soil motion; consequently there was no structural damage. The permanent movements of the boxes were 3.8 feet and 0.5 foot, horizontally, away from the point of burst. It is concluded that buried structures of the type tested are difficult to damage structurally, unless located within or close to the edge of the crater and that, for structures outside of the crater, problems created by large earth movements and throwout might be critical for structures relatively close to the edge of the crater.

AD-617 195 Div. 22/6
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Mines, Pittsburgh, Pa.
STRESS WAVES IN BOUNDED MEDIA.
Quarterly rept. no. 2, 1 Mar-31 May 65,
by Richard W. Watson, Karl R. Becker, and Frank C. Gibson. 22 Jun 65, 37p

Unclassified report

See also AD-613 935.

Descriptors: (*Explosive materials, Detonations), (*Shock waves, Ballistics), (*Targets, Penetration), Stresses, Metals, Aluminum, Magnesium, Beryllium, Trajectories, Attenuation, Tetryl, TNT, Liquids, Solids, Numerical analysis.

A shock-wave signature technique based on the 130-kilobar phase transition in Armco iron was explored. In addition, a spherical shock source to be used in shock reflection studies was developed and calibrated. The results of a detonation-rate study, using both liquid and solid explosive systems, as well as some theoretical computations of the oblique collision of metallic liners, are also presented.

20. Physics

AD-616 433 Div. 25/2

Lincoln Lab., Mass. Inst. of Tech., Lexington.
COMPLEX vs BAND FORMATION IN PEROVSKITE OXIDES,
by J. B. Goodenough and P. M. Raccah. 1965, 2p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1031-2 Mar 1965(Copies not available to DDC or Clearinghouse customers).
Operated with support from the U. S. Air Force.

Descriptors: (*Oxides, Atomic orbitals), (*Ferroelectric crystals, Atomic orbitals), Ions, Cobalt, Atomic properties, Magnetism, Crystal substructure, Low-temperature research, Crystal lattices.

AD-616 434 Div. 25/3

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DETERMINATION OF MAGNETIC ORDERING IN HEISENBERG MAGNETS FROM HIGH-TEMPERATURE EXPANSIONS,
by T. A. Kaplan, H. E. Stanley, K. Dwight, and N. Menyuk. 1965, 2p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1129-30 Mar 1965(Copies not available to DDC or Clearinghouse customers).
Operated with support from the U. S. Air Force.

Descriptors: (*Magnetism, Determination), Antiferromagnetism, Ferromagnetism, Hamiltonian, Field theory, High-temperature research.

AD-616 435 Div. 20/2

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIFFUSE PARAMAGNETIC NEUTRON SCATTERING IN CHROMIUM SPINELS,
by K. Dwight, N. Menyuk, and T. A. Kaplan. 1965, 2p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1090-1 Mar 1965(Copies not available to DDC or Clearinghouse customers).
Operated with support from the U. S. Air Force.

Descriptors: (*Neutron scattering, Chromium), (*Chromium, Spinels), (*Neutron diffraction analysis, Chromium compounds), Manganese compounds, Sulfur compounds, Oxygen compounds, Hamiltonian.

This paper describes an investigation of the diffuse neutron diffraction attributable to the paramagnetic state in normal, cubic spinels. The elastic neutron scattering is calculated from the high-temperature expansion of the correlation function as a power series in inverse temperature, the pertinent coefficients being evaluated elsewhere for a Heisenberg Hamiltonian with both nearest-neighbor A-B and B-B interactions. After normalization to the nuclear diffraction pattern, the computed diffuse scattering is compared with the experimental findings for both MnCr2O4 and MnCr2S4. Good agreement exists in both cases, despite the striking qualitative difference between these two patterns. This agreement supports the calculational model, and thereby answers earlier speculation concerning the origin of the liquid-type diffraction peaks observed in the room-temperature diffraction patterns of most chromium spinels. It is shown that these peaks are not directly related to any spin canting in the ground state. They arise from the basic antiferromagnetic nature of the exchange interactions, would persist in the absence of any B-B exchange, and can be suppressed by sufficiently strong ferromagnetic B-B interactions, as evidenced in MnCr2S4. (Author)

AD-616 437 Div. 25/6

Lincoln Lab., Mass. Inst. of Tech., Lexington.
LORENTZ MICROSCOPY OF SMALL FERROMAGNETIC PARTICLES,
by M. S. Cohen. 1965, 2p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1060-1 Mar 1965(Copies not available to DDC or Clearinghouse customers)
Operated with support from the U. S. Air Force.

Descriptors: (*Ferromagnetic materials, Solid state physics), (*Solid state physics, Ferromagnetic materials), Metal films, Nickel, Iron, Magnetic properties.

Theoretical considerations show that uniaxially anisotropic ferromagnetic particles of sufficiently small size will not exhibit complex multidomain states, but simple magnetization configurations. Special methods have permitted the preparation of two-dimensional analogs of such particles, i.e., islands of NiFe film on a nonmagnetic substrate. Lorentz microscopy of these specimens gave direct evidence for the predicted configurations: (a) a circular magnetization configuration, (b) a two-domain state, (c) a single-domain strate. Islands in the single-domain state reversed by creation and breakup of a 'locked' magnetization configuration. (Author)

AD-616 439 Div. 25/3, 25/2, 4/4

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MAGNETIC PROPERTIES OF MnCr2S4,
by N. Menyuk, K. Dwight, and A. Wold. 1965, 2p
Contract AF19 628 3837
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1088-9 Mar 1965(Copies not available to DDC or Clearinghouse customers)
Prepared in cooperation with Brown Univ., Providence, R. I.

Descriptors: (*Magnetic properties, Manganese compounds), (*Neutron diffraction analysis, Manganese compounds), Chromium compounds, Sulfides, Ions, Spinels, Crystal structure, Magnetic moments, Cryogenics.

The neutron diffraction pattern of MnCr2S4 at room temperature shows it to be a normal cubic spinel. The magnetization of this material was measured from 4.2K through the Curie temperature. It was then determined, on the basis of a molecular field calculation, that the shape of the magnetization curve requires a large and ferromagnetic B-B interaction such that J sub BB/J sub AB-4. This is in general accord with Lotgering's conclusion, which was based on paramagnetic susceptibility data, and indicates that the material should have a simple Neel (collinear) spin configuration. This expectation was confirmed by a 4.2 K neutron diffraction investigation which also established the cation moments to be 3 mu sub B per chromium ion and 4.7 mu sub B per manganese ion, in agreement with the measured net magnetization

of 1.3 mu sub B. Furthermore, the 4.2K diffraction pattern clearly indicates that the reduction of the manganese moment below its spin-only value cannot be attributed to A-site canting. On the basis of the above results, we are forced unequivocally to the conclusion that the tetrahedrally coordinated Mn(2+) cannot be in a pure 6 S5/2 state. (Author)

AD-616 441 Div. 8/6

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MEASUREMENTS OF UHF AND L-BAND RADAR CLUTTER IN THE CENTRAL PACIFIC OCEAN,
by G. R. Curry. 23 Jun 64, 6p
Unclassified report

Pub. in IEEE Transactions on Military Electronics vMIL9 n1 p39-44 Jan 1965(Copies not available to DDC or Clearinghouse customers)
Operated with support from ARPA.

Descriptors: (*Radar clutter, Measurement), (*Pacific Ocean, Radar clutter), Ultrahigh frequency, L band.

AD-616 443 Div. 25/2, 25/6

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SUPERCONDUCTING CHARACTERISTICS OF THE HIGH-PRESSURE InSb- beta TIN SYSTEM,
by M. D. Banus, Susan Nye Vernon, and H. C. Gatos.
18 Sep 64, 1p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt1 p864 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Superconductors, Phase studies), (*Indium alloys, Superconductivity), (*Antimony alloys, Superconductivity), (*Tin alloys, Phase studies), Crystal lattices, Heat treatment, Solid solutions, High-pressure research, Quenching (Cooling).

Phase studies conducted on the In Sb II - beta Sn system led to the conclusion that the system does not exhibit a two-phase region but rather complete solid solubility under equilibrium conditions.

AD-616 444 Div. 25/2, 17/5

Lincoln Lab., Mass. Inst. of Tech., Lexington.
UNIAXIAL-ANISOTROPY SPECTRUM IN NONMAGNETOSTRICTIVE PERMALLOY FILMS,
by D. O. Smith and G. P. Weiss. 1965, 2p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p962-3 Mar 1965 (Copies not available to DDC or Clearinghouse customers)
Operated with support from the U. S. Air Force.

Descriptors: (*Metal films, Anisotropy), (*Anisotropy, Metal films), (*Nickel alloys, Iron alloys), (*Iron alloys, Nickel alloys), Magnetostriction, Magnetic fields, Crystal lattices, Heat of activation, Rotation, Iron, Atoms.

The uniaxial-anisotropy spectrum in Permalloy films has been studied by: (1) deposition in a magnetic field on a substrate at temperature T(s), (2) annealing in either a dc field or a circular rotating field for specified time intervals, (3) quenching of the substrate holder by water-cooled coils. Significant aspects of this procedure are: (1) annealing is carried out before exposure to air (oxygen), (2) quenching gives well-defined annealing times, (3) each experiment involves freshly deposited samples which are in a well-defined and reproducible state. These experiments have led to the identification of five separate contributions to the anisotropy in nonmagnetostrictive Permalloy, namely: (1) and (2) two types of contributions due to lattice vacancies with rotational activation energies < or = 0.2 eV and which became locked after exposure to air (oxygen), (3) and (4) two contributions with rotational activation energies about 1 eV, thought to be due to half self-interstitials and carbon interstitials, respectively, and (5) directed Fe-Fe pairs. (Author)

AD-616 445 Div. 20/1

Lincoln Lab., Mass. Inst. of Tech., Lexington.
BAND STRUCTURE OF GADOLINIUM METAL,
by J. O. Dimmock, A. J. Freeman, and R. E. Watson.
1965, 1p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1142 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gadolinium, Electron transitions), Atomic energy levels.

Approximate nonrelativistic energy bands for Gd metal were obtained by using the augmented plane wave method. The calculated bands differ markedly from the free electron model due to the fact that the bands originating from atomic 5d and 6s states overlap and are strongly mixed. The bands show a close resemblance to those of the transition metals. This resemblance also appears in the calculated density-of-states curve. The density of states at the Fermi energy is large, about three times that of the free electron model. This density of states is about one half that given for Sc, Y, and La by specific heat measurements.

AD-616 446 Div. 25/3, 4/4

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ELECTRICAL PROPERTIES OF FERROMAGNETIC CrO-X (1.89 < x < 2.02),
by D. S. Chapin, J. A. Kafalas, and J. M. Honig.
20 Nov 64, 8p
Unclassified report

Pub. in Journal of Physical Chemistry v69 n4 p1402-9 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Chromium compounds, Oxides), (*Ferromagnetism, Chromium compounds), Electrical properties, Resistance (Electrical), Temperature, Atomic energy levels, Crystal structure.

The resistivity (rho) and Seebeck coefficients (alpha) of hot-pressed CrOx (1.89 < x < 2.02) have been determined in the temperature (T) range 0-450K. Rho increased slightly with rising T; no significant anomaly was encountered at the Curie point of the samples. Plots of alpha vs. T exhibited four types of temperature dependence. Both alpha and rho change only slightly with x. The data are interpreted in terms of a band scheme recently proposed by Goodenough (J. B. Goodenough. Paper submitted to International Colloquium of CNRS on Oxygen Compounds of Transition Elements in the Solid State; Borleaux, Sept. 1964). (Author)

AD-616 452 Div. 20/1, 15/1, 25/5

Cambridge Univ. (England).
ASYMPTOTIC BEHAVIOR OF FEYNMAN INTEGRALS WITH SPIN,

by J. C. Polkinghorne. 21 Apr 64, 8p
Grant AF EOAR63 79
AROSR 65-0833

Unclassified report

Pub. in Journal of Mathematical Physics v5 n11 p1491-8 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear spins, Integrals), (*Integrals, Nuclear spins), Perturbation theory, Elementary particles, Quantum mechanics, Nucleons, Meson reactions, Relativity theory.

Some general features are investigated of the dependence of the asymptotic behavior of Feynman integrals upon factors in the numerator of the integrand resulting from particles with spin. These results are used to analyze the high-energy behavior of ladder diagrams for spin-1/2 nucleons interacting with neutral vector mesons. The leading contribution is shown to consist of terms corresponding to a reggeised nucleon together with certain other terms. The expected cancellation of these other terms by terms associated with a well-defined class of crossed diagrams is verified in detail for the sixth-order case. Finally, other significant diagrams, different from the ladders and their associated crossed diagrams, are investigated and it is shown that they only provide higher-order corrections to the trajectory of the reggeised nucleon. (Author)

AD-616 456 Div. 25/6

Technion - Israel Inst. of Tech., Haifa. Dept. of Mechanics.
ON THE ANALYSIS OF DEFORMATION AND THE STRAIN TENSORS.
Memorial vol.,
by Zvi Karni. 1964, 13p
Grant AF EOAR62 57
AFOSR 3113

Unclassified report

Pub. in mono. Topics in Applied Mechanics, Amsterdam, 1965 p287-98 (Copies available only to DDC users).

Descriptors: (*Tensor analysis, Deformation), (*Strain(Mechanics), Tensor analysis), Rotation.

A finite rotation tensor is introduced, and the effect of the rotation on the strain tensors is analysed. (Author)

AD-616 457 Div. 25/7, 30/5, 25/4

National Electrotechnical Inst., Turin (Italy).
PRINCIPLES OF SELF-MODULATING DERIVATIVE OPTICAL SPECTROSCOPY,
by G. Bonfiglioli and P. Brovetto. 14 Jan 64, 8p
Grant AF EOAR87 63, Proj. 9763, Task 976302
AFOSR 65-0752

Unclassified report

Pub. in Applied Optics v3 n12 p1417-24 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Spectroscopy, Optical phenomena), (*Spectrum analyzers, Modulation), Gain, Spectra-(Visible + ultraviolet), Differentiating circuits.

This paper presents the theoretical principles underlying a new technique of optical spectroscopy, characterized by the fact that the record of a spectrum, differentiated and efficiently purified of noise, is obtained in a direct and simple way. The interest of derivative optical spectroscopy is evidenced by calculations showing for a typical case the gain to be expected. A set of equations is then given showing the dependence of the new spectrometer performance on the principal design parameters. Experimental results will be reported in another paper. (Author)

AD-616 463 Div. 20/2, 15/1

Institute of Field Physics, Univ. of North Carolina, Chapel Hill.
THEOREM ON SEPARATION OF VARIABLES WITH APPLICATION TO STATIC-SOURCE MESON THEORY,
by Edward A. Remler. 15 May 64, 5p
Grant AF AFOSR153 63
AFOSR 65-0480

Unclassified report

Pub. in The Physical Review v136 n2B pB491-5 Oct 26 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Meson reactions, Partial differential equations), (*Partial differential equations, Meson reactions), Field theory, Invariance, Quantum mechanics, Nucleons, Pions, Bosons, Nuclear spins.

A general formulation is given of the process by means of which one eliminates certain redundant degrees of freedom occurring in interacting quantum-mechanical systems. This may be considered a generalization of the transformation to center of mass in problems having translational invariance. When applied to the pion-nucleon system, the static-source approximation arises as the first term in a series, the higher terms of which are easily calculable using an algorithm developed in the Appendix. This system is not an expansion in the inverse mass of the nucleon, and it is shown that the static source approximation need not be considered as a nonrelativistic approximation. (Author)

AD-616 465 Div. 25/6

National Electrotechnical Inst., Turin (Italy).
RESEARCH ON THE PHYSICS OF SOLIDS AT THE ELECTRON MICROSCOPE LABORATORY OF THE NATIONAL INSTITUTE OF ELECTRICITY (Ricerche di Fisica dei Solidi Presso il Laboratorio di Microscopia Elettronica dell'IEN),
by Guido Bonfiglioli. 14 Feb 63, 14p
AFOSR 65-0763

Unclassified report

Pub. in Fisica dello Stato Solido: Convegno Indetto dalla Societa Lombarda di Fisica, Pavia, 16-18 Luglio 1962
Text in Italian
(Copies available only to DDC users).

Descriptors: (*Solid state physics, Electron microscopy), (*Electron microscopy, Solid state physics), Luminescence, Electroluminescence, Fission products, Mica, Surface properties, Electrical conductance, Metals, Italy.

Several subjects which have been or are being investigated at the laboratory are surveyed. First, alkali halide thermoluminescence above room temperature: a model is proposed, using a 2nd order kinetics, that accounts well for a number of experimental results rather poorly explained by previous theories. Experiments are then mentioned on intrinsic electroluminescence of ZnS specimens, undergoing linear voltage transients. The results are compared with those predictable on the basis of a mathematical development of Zalm's theory. Electron microscopy studies of tracks of fission products in mica are then quoted, to end with a mention of experiments on surface electrical conductivity in metals. (Author)

AD-616 467 Div. 20/2

Maryland Univ., College Park.
CHOICE BETWEEN PRIMARY AND DYNAMICAL mag delta T = 1/2 RULE IN THE CURRENT-CURRENT PICTURE FOR NONLEPTONIC WEAK DECAYS,
by Jogesh C. Pati and Sadao Oneda. 7 Jul 64, 5p
Grant AF AFOSR500 64, Proj. 9751, Task 9751 01
AFOSR 65-0826

Unclassified report

Pub. in The Physical Review v136 n4B pB1097-1101 Nov 23 1964
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Decay schemes, K mesons), (*Selection rules, Decay schemes), Pions, Strange particles, Leptons.

The P-wave intrinsic structure of K to 3 pion decays is studied in the current-current picture for nonleptonic weak interactions, and it is shown that an accurate measurement of the asymmetry parameters of K to 3 pion decays could distinguish whether or not the mag delta T = 1/2 rule is primary or dynamical. In case of the former, as is expected, not only the rates, but also the asymmetry parameters of K to 3 pion decays should be consistent with a dominant (i.e., apart from electromagnetism) mag delta T = 1/2 rule, while for the latter, one should expect to observe a large violation of the mag delta T = 1/2 rule in the asymmetry parameters of K to 3 pion decays with or without a similar violation in the rates. Some comments are made concerning the general necessity of enhancement of nonleptonic modes regardless of whether the mag delta T = 1/2 rule is primary or dynamical. (Author)

AD-616 474 Div. 20/2, 2/1
CFSTI Prices: HC$1.00 MF$0.50

Brandeis Univ., Waltham Mass. Astrophysics Inst.
NEUTRINO PAIR EMISSION FROM EXCITED NUCLEI (II),
by Minoru Nishida and Shiro Sakashita. Feb 65, 8p
Scientific rept. no. SR-2
Contract AF19 628 4019, Proj. 8647, Task 864701
AFCRL 65-263

Unclassified report

Research done in cooperation with Hokkaido Univ., Sapporo (Japan).

Descriptors: (*Neutrinos, Pair production), (*Excitation, Nuclei), Sodium, Annihilation reactions, Stars, Solar atmospheres, Astrophysics.

The neutrino emission rate from the excited state of Na23 is computed. This neutrino emission is comparable with other neutrino processes in the density range of 100,000 to 1,000,000 g/cc and at temperatures near 10 to the ninth power degrees K. (Author)

AD-616 491 Div. 25/4

Towne School of Civil and Mechanical Engineering, Univ. of Pennsylvania, Philadelphia.
USE OF ANALYTIC SIGNALS IN THIRD-AND FOURTH-ORDER COHERENCE FUNCTIONS,
by M. Beran and P. Corson. 14 Jul 64, 12p
Grant DA ARO D31 124G331
AROD 3734:5

Unclassified report

Pub. in Journal of Mathematical Physics v6 n2 p271-82 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electromagnetic waves, Monochromatic light), Signals Functions, Integral transforms, Moments, Statistical processes.

In this paper complex forms of the third- and fourth-order coherence functions are defined using analytic signals. The relations between the complex forms and the real forms are given in detail. It is shown how to use the complex forms in the solution of radiation problems. The quasimonochromatic approximation greatly simplifies the calculations and this simplification is discussed for radiation problems in terms of the complex forms. The paper concludes with a discussion of quasimonochromatic radiation from a modulated incoherent source representing, perhaps, a self-luminous turbulent region. (Author)

AD-616 493 Div. 25/7

Minnesota Univ., Minneapolis. School of Physics.
THEORY OF RESONANCE ABSORPTION LINE SHAPES IN MONATOMIC GASES,
by Gene P. Reck, Hisao Takebe, and C. Alden Mead.
9 Sep 64, 16p
Grant AF AFOSR13 63
AFOSR 65-0679

Unclassified report

Pub. in Physical Review v137 n3A pA683-98 Feb 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Resonance absorption, Absorption spectrum), (*Absorption spectrum, Line spectrum), Gases, Atomic spectroscopy, Pressure, Density, Refractive index, Perturbation theory, Hamiltonian.

It is pointed out that the usual theories of pressure broadening disagree with direct experimental measurements of the widths of resonance-broadened alkali doublet lines, although the theories are at least qualitatively confirmed for the wings of resonance lines and for foreign-gas broadening. There are also two conflicting sets of experimental data (both in strong disagreement with theory). Some qualitative arguments are given for doubting the validity, near the center of a resonance line, of the 'two-body' approximation generally used in theoretical treatments, and some formal objections to the usual procedure are also presented. The basic equation relating the susceptibility to a resolvent operator matrix element is derived from a more fundamental point of view than usual; the result contains in principle all effects due to translational motion, to the quantized nature of the radiation field, and to 'spatial dispersion.' In the limit of large absorber mass it is proved rigorously that the two-body approximation can never be valid near the center of a line, even for very low densities. By using different approximations for the wings and the line center, we obtain satisfactory agreement with experiments in both regions for the alkali doublet lines. We are also able to decide between the two conflicting experiments, favoring the square-root density dependence of the line-width observed by Lauriston and Welsh. (Author)

AD-616 500 Div. 25/3, 9/1

RAND Corp., Santa Monica, Calif.
EFFECT OF A TRANSVERSE MAGNETIC FIELD ON THE ESCAPE SPEED OF A CONDUCTING FLUID. Revised ed.,
by Carl Greifinger. 9 May 60, 9p
Rept. no. P-1875 Unclassified report
Available only for reference use at DDC field services. Copy is not available for public sale. Revision of manuscript submitted 7 Jan 60.

Descriptors: (*Magnetohydrodynamics, Mathematical analysis), Magnetic fields, Fluid flow, Electrical conductance.

The purpose of this note was to point out two things: (1) for a given initial ratio of the magnetic pressure to the hydrodynamic pressure in the conducting fluid, the escape speed is not uniquely defined, but depends on the magnetic pressure in the vacuum into which the fluid is expanding; and (2) the integrals appearing in the generalized Riemann invariants can be evaluated analytically.

AD-616 513 Div. 25/3
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
ON THE STABILITY OF SOLUTIONS OF THE LINEARIZED PLASMA EQUATION,
by Richard Bellman and John M. Richardson.
2 Feb 60, 8p Rept. no. P-1898

Unclassified report

Descriptors: (*Plasma physics, Equations), (*Equations, Plasma physics), Stability, Integral transforms, Functions.

AD-616 517 Div. 9/4, 12/3
CFSTI Prices: HC$4.00 MF$1.00

Therm Advanced Research, Inc., Ithica, N. Y.
ON THE HYDRODYNAMIC THEORY OF WATER-EXIT AND -ENTRY,
by John P. Moran. Mar 65, 130p TAR-TR-6501
Contract Nonr443800

Unclassified report

Descriptors: (*Water entry, Hydrodynamics), (*Hydrodynamics, Water entry), Theory, Numerical analysis, Guided missiles(Underwater-to-surface), Boundary layer, Slender bodies, Compressive properties, Equations, Gravity, Air, Density.

The mathematical theory of water-exit and -entry is critically reviewed. A detailed examination of each of the principal methods of analysis available shows that none of them yields even a uniformly valid approximation to the solution during surface crossing. It is concluded that, due to mathematical difficulties inherent in the problem, the best hope for obtaining a reliable estimate of the loads felt in crossing lies with a numerical analysis. Specific recommendations are made as to the formulation of practical numerical methods. (Author)

AD-616 518 Div. 25/7, 20/1
CFSTI Prices: HC$4.00 MF$1.00

General Atomic Div., General Dynamics Corp., San Diego, Calif.
MEASUREMENT OF FAST NEUTRON SPECTRA IN AN INFINITE MEDIUM OF CH2.
Final rept. for 24 Mar-24 Nov 64,
by A. E. Profio and J. Kirkbride. Apr 65, 144p
Rept. no. GA-5973
Contract AF29 601 6376, Proj. 1831, Task 183109
WL TR-64-180

Unclassified report

Descriptors: (*Neutron spectrum, Waxes), (*Fast neutrons, Neutron spectrum), Neutron flux, Measurement, Polyethylene plastics, Linear accelerators.

Measurements of the fast neutron spectrum and angular distribution in a large assembly of paraffin wax (CH2) were performed. Two targets were irradiated with a pulsed electron beam from a linear accelerator, one an essentially point isotropic fission spectrum source and the other a narrow photoneutron source for small angle measurements. The time-of-flight technique was employed to measure the energy from approximately 0.3 Mev to approximately 15 Mev with an energy resolution of 10 percent. Estimated error in the spectrum is ±10 percent from 0.5 to 8 Mev and ±20 percent outside this range. The source spectra were measured in air for input to calculations. Data were obtained at 0 deg up to 15 cm penetration with preliminary results to 45 cm. Angular flux measurements were made up to 60 deg at 30 cm, with preliminary data at 8 deg and 45 cm. The results, within the stated accuracy and resolution, should be suitable for testing analytical techniques and corresponding shielding codes. (Author)

AD-616 523 Div. 25/6
CFSTI Prices: HC$1.00 MF$0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
ELECTRON TRANSIT IN AgBr AT 85 degrees K,
by John D. Knapton. Mar 65, 20p BRL-R-1277
Proj. 1A010501B010

Unclassified report

Descriptors: (*Silver compounds, Bromides), (*Electrons, Drift), Excitation, Crystals, Cryogenics, Electron beams.

Some of the factors which can affect the transit of a pulse of electrons across a Bridgman AgBr crystal at 85 ± 2 K were studied. The factors studied include the electron drift mobility (mu), electron trapping, and electrode charge injection. A fast pulse (5 nanosec) electron beam system was used for the excitation source. The value for mu, in substantial agreement with the work of Chollet and Rossel (J. Helv. Phys. Acta. 33:627 (1960); Proc. of the International Conf. on Semiconductor Physics, Prague, 1960. Academic Press, 1961, p. 677), was found equal to 389 ± 12% sq cm/vsec. This value indicates that the scattering mechanism is primarily by longitudinal optical vibrations. Three different methods were used for determining mu: (1) measuring the rise time of the integrated charge associated with the electron pulse motion, (2) measuring the duration of the electron current pulse, and (3) fitting the integrated charge to a uniform trapping theory. Agreement was obtained between the three methods. Evidence is presented for an electron emission process possibly caused by shallow trapping. No evidence for electrode charge injection was found. (Author)

AD-616 532 Div. 8/6, 5/2
CFSTI Prices: HC$2.00 MF$0.50

Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
DETAILED DATA ANALYSIS OF ECHO I, ECHO II AND MOON REFLECTED SIGNALS. VOLUME 2. AUTOCORRELATION FUNCTIONS OF ECHO II REFLECTED SIGNALS,
by J. W. Eberle and S. L. Zolnay. May 65, 35p
Contract AF30 602 2166, Proj. 4519, Task 451901
RADC TR-65-68 V2

Unclassified report

Descriptors: (*Communications satellites(Passive), Radar reflections), (*Radar reflections, Statistical functions), Signlas, Data, Analysis, S band, Moon.

The report deals with the short-term autocorrelation function of Echo I-reflected signals. The sample lengths were 30 seconds; maximum time delays were approximately ten per cent of sample length. The autocorrelation

function is discussed, and the adaptation of its computation to digital techniques is presented. Two methods for linearizing the data are given. An expression for the specular-to-spattered power ratio is derived, and the inverse transform of the autocorrelation function is discussed. The surface roughness of the reflector, the discrete fading rates, and fading frequencies are considered in detail. More than 50 autocorrelation curves are shown. These autocorrelation functions were obtained from pulsed and from cw signals, at sampling rates of 29, 50, and 100 per second during different revolutions, with the satellite in various path geometries, and with the data linearized and not linearized prior to computing the autocorrelation function. In applicable cases the specular-to-scattered power ratio was computed. Qualitative evaluation of the Fourier transform of the ACF, i.e., by the power spectrum, is also presented. (Author)

AD-616 533 Div. 8/6, 5/2, 8/1
CFSTI Prices: HC$1.00 MF$0.50

Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
DETAILED DATA ANALYSIS OF ECHO I, ECHO II AND MOON REFLECTED SIGNALS. VOLUME 3. MEASUREMENT OF RELATIVE PHASE DIFFERENCES BETWEEN ELEMENTS OF AN ADAPTIVELY PHASED ARRAY,
by S. L. Zolnay and J. W. Eberle. May 65, 20p
Contract AF30 602 2166, Proj. 4519, Task 451901
RADC TR-65-68 V3
Unclassified report

Descriptors: (*Communication satellites(Passive), Radar reflections), (*Phased arrays, Phase measurement), Phase detectors, Signals, Statistical functions, Data, Analysis, Moon.

The report described a method for measuring the relative phase differences between elements of an adaptively-phased array. A discussion is presented on the need for such measurements, especially from the viewpoints of adaptively phasing on array of transmitting antennas, and the method of measurement is described. The instrumentation of a 27 mc/sec phase detector is given in detail, including an accurate circuit diagram. The experimental results of calibrating the instrument are included. Data obtained on actual Echo-reflected signals show that the adaptively-phased array elements were performing their cohering function. (Author)

AD-616 534 Div. 8/6, 5/2
CFSTI Prices: HC$1.00 MF$0.50

Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
DETAILED DATA ANALYSIS OF ECHO I, ECHO II AND MOON REFLECTED SIGNALS. VOLUME 4. THE LONG-TERM AUTOCORRELATION FUNCTION OF ECHO II REFLECTED SIGNALS,
by S. L. Zolnay and J. W. Eberle. May 65, 9p
Contract AF30 602 2166, Proj. 4519, Task 451901
RADC TR-65-68 V4
Unclassified report

Descriptors: (*Communication satellites(Passive), Radar reflections), (*Radar reflections, Statistical functions), Signals, Data, Analysis, Rotation, Reflectors.

It is concluded that Echo II is apparently rotating in its orbit with a period between 90 and 95 seconds and that the ratio of extreme radii of curvature is 1.03, representing essentially a spherical reflector for the aspect angles involved in the measurement. (Author)

AD-616 535 Div. 8/6, 5/2, 8/1
CFSTI Prices: HC$2.00 MF$0.50

Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
DETAILED DATA ANALYSIS OF ECHO I, ECHO II AND MOON REFLECTED SIGNALS. VOLUME 1. THE SIGNAL TO NOISE RATIO IMPROVEMENT IN ADAPTIVELY PHASED ARRAYS.
Interim rept. for Jan-Sep 64,
by S. L. Zolnay and J. W. Eberle. May 65, 29p
Contract AF30 602 2166, Proj. 4519, Task 451901
RADC TR-65-68 V1
Unclassified report

Descriptors: (*Communication satellites(Passive), Radar reflections), (*Moon, Radar reflections), (*Phased arrays, Signal-to-noise ratio), Signals, Reflections, Data, Statistical function, Analysis, S band.

This report presents the results of a detailed analysis of data collected from January through September 1964 using Echo 1, Echo 11, and the moon as reflectors of S-band signals. Information is presented, in four volumes, signal-to-noise ratio improvement in adaptively phased arrays and the autocorrelation function of signals reflected from Echo 11. (Author)

AD-616 542 Div. 25/4, 8/1
CFSTI Prices: HC$1.00 MF$0.50

Delaware Univ., Newark. Dept. of Physics.
SCANNING OF LIGHT BEAMS USING FRANZ-KELDYSH-EFFECT,
by K. W. Boer. 1965, 7p
AROD 4461:3 Unclassified report

Descriptors: (*Beams(Electromagnetic), Scanning), (*Absorption spectrum, Semiconductors), Deflection, Light, Electric fields, Refractive index, Resolution, Differential equations.

AD-616 547 Div. 25/4
CFSTI Prices: HC$1.00 MF$0.50

Rochester Univ., N. Y. Dept. of Physics and Astronomy.
THEORETICAL STUDIES OF EFFECTS OF COHERENCE IN ELECTROMAGNETIC RADIATION.
Final rept. for 1 Mar 63-28 Feb 65,
by Emil Wolf. Mar 65, 18p
Grant AF AFOSR237 63 Unclassified report

Continuation of Grant AF AFOSR62 246.

Descriptors: (*Electromagnetic waves, Optical analysis), Abstracting, Diffraction, Light, Statistical analysis, Blackbody radiation.

The results of the investigations on the effects of coherence in electromagnetic radiation are given in twenty papers published in various scientific journals. Titles and authors of these papers are listed. Summaries of the papers, which record the main results obtained are given. In addition, some of the results were also presented in a number of papers given at various scientific conferences and in lectures given at various Universities and Laboratories. These are listed. A list of the personnel which assisted in this research is given.

AD-616 555 Div. 25/5, 15/1
CFSTI Prices: HC$3.00 MF$0.75

New York Univ., N. Y. Dept. of Physics.
INTRODUCTION TO THE DENSITY MATRIX,

by A. E. Glassgold. 1964, 61p
Technical rept. no. N65-1
Contract Nonr28558, Proj. NR014 311
Unclassified report

Available copy will not permit fully legible reproduction Reproduction will be made if requested by users of DDC Copy is available for public sale.

Descriptors: (*Operators(Mathematics), Quantum mechanics), (*Statistical mechanics, Operators(Mathematics)), (*Quantum mechanics, Matrix algebra), Quantum statistics, Distribution theory, Partial differential equations, Electrons, Spin, Photons, Polarization, Masers.

General properties of the density matrix are summarized. These properties are illustrated by examples such as electron spin, photon polarization, two-level maser, polarization of coupled spins, scattering of quantum mechanical systems, Dirac's density matrix, and Bloch's equation.

AD-616 556 Div. 25/1
CFSTI Prices: HC$1.00 MF$0.50

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
PHYSICAL ACOUSTICS,
by S. D. Weiner and U. Ingard. 1965, 24p
Contracts Nonr184142, DA36 039AMC03200E
Unclassified report

Pub. in Research Lab. of Electronics Quarterly Progress Report n77 p67-89 Apr 15 1965, AD-615 324.

Descriptors: (*Physics, Scientific research), (*Acoustics, Scientific research), Transducers, Lead compounds, Zirconates, Titanates, Speech, Speech representation, Shock tubes, Temperature, Field theory, Shock waves, Sound, Theory, Ceramic materials.

Contents:
Response of lead zirconate titanate ceramics to temperature fluctuations: Transducers, calibration with a chopped air stream; response to a shock wave; speech waveforms
Spontaneous instability in parallel flows
Dispersion relation for ultrasound in gyrotropic quantum plasma
Diffusion waves.

AD-616 588 Div. 20/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
DISSIPATION FUNCTIONS AND INVARIANT IMBEDDING, I.
Revised ed.,
by Richard Bellman, Robert Kalaba, and G. Milton Wing. 22 Apr 60, 6p Rept. no. P-1952
Unclassified report

Revision of 24 Mar 60.

Descriptors: (*Functions, Invariance), (*Neutron transport theory, Mathematical models), Differential geometry, Algebra, Differential equations, Matrix algebra.

In a series of papers dating from 1956, the authors have used the theory of invariant imbedding to derive a variety of nonlinear functional equations for the description of radiative transfer, neutron transport, diffusion and heat conduction, scattering and random walk, and wave propagation. In this paper a new method is presented for establishing the existence of solutions of these equations in the cases where no creation of matter is involved. This method is based upon the introduction of a new class of physically important functions, the dissipation functions. Combining these new functions with the functions utilized in the past, the reflection and transmission functions, we easily obtain a basic conservation relation upon which all else hinges. The uniqueness proofs follow conventional lines. (Author)

AD-616 598 Div. 25/6, 25/3

RAND Corp., Santa Monica, Calif.
CRYOGENIC GYROS,
by W. H. Culver and M. H. Davis. 5 Feb 60, 10p
Rept. no. P-1967
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Gyroscopes, Cryogenics), (*Superconductors, Gyroscopes), Superconductivity, Lead, Magnetic fields.

AD-616 604 Div. 25/6, 15/1
CFSTI Prices: HC$2.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
ASYMPTOTIC ANALYSIS OF THE AXISYMMETRIC VIBRATIONS OF SHELLS,
by Edward W. Ross, Jr. Apr 65, 33p
AMRA TR-65-08
Proj. 1C014501B33A, Task 35791
Unclassified report

Descriptors: (*Elastic shells, Vibration), Bodies of revolution, Partial differential equations, Series, Bessel functions, Dynamics, Membranes, Continuum mechanics, Acoustics.

An asymptotic analysis is carried out for the equations of axisymmetric vibration of thin shells, somewhat analogous to the procedure by which geometrical optics is obtained from electromagnetic theory. It is found that two types of asymptotic solutions are obtained, roughly classifiable as high-frequency membrane solutions and bending solutions. Two explicit representations of these solutions are obtained, one for the shallow region of a shell, and the other for the non-shallow region. A number of interesting conclusions emerge from the analysis. (Author)

AD-616 605 Div. 25/6
CFSTI Prices: HC$1.00 MF$0.50

Army Materials Research Agency, Watertown, Mass.
THE ROTATIONALLY SYMMETRIC MOTION OF A SMALL-ANGLE TRUNCATED CONICAL SHELL DUE TO A CONSTANT VELOCITY PRESSURE FRONT. PART II. NUMERICAL RESULTS,
by Joseph I. Bluhm and Donald M. Neal. Apr 65, 24p AMRA TR-65-09
Proj. 1C014501B33A, Task 35791
Unclassified report

See also AD-425 702.

Descriptors: (*Conical bodies, Motion), (*Mechanics, Vibration), Pressure, Differential equations, Digital computers, Numerical methods + procedures.

A thin truncated conical shell is analyzed for the initial transient response due to the passage of a pressure front of constant velocity and amplitude. The principle of virtual work is applied to a segment of the shell, between two adjacent generatrices, treated as a beam on an elastic foundation. The ends of the shell are considered to be simply supported. First, the natural or free modes of vibration are approximated using an eight-term series of functions each satisfying the boundary condition. Then the resulting modes are used in conjunction with time-dependent coefficients to formulate the forced response. PART I, the initial report, consisted of the analysis and derivations pertinent to the problem. PART II, the present report, contains the numerical results and plotted data. (Author)

AD-616 606 Div. 25/6, 17/7
CFSTI Prices: HC$1.00 MF$0.50

General Electric Research Lab., Schenectady, N. Y.
RESEARCH ON CdTe.
Quarterly progress rept. no. 15,
by R. E. Halsted, D. T. F. Marple, and B. Segall.
30 Apr 65, 22p
Contract AF33 616 8264

Unclassified report

See also AD-610 801.

Descriptors: (*Cadmium alloys, Tellurium alloys), (*Tellurium alloys, Cadmium alloys), (*Semiconductors, Intermetallic compounds), Purification, Single crystals, Crystal growth, Zone melting, Transport properties, Impurities, Phosphorus, Electrical properties, Fluorescence, Cryogenics, Silver, Preparation.

The report summarizes work in several areas of research on CdTe which has received considerable attention, but has not been brought to a satisfactory conclusion. It describes the status of continuing activity on the purification of CdTe and single crystal growth. A second area of interest has been the problem of establishing preparation conditions which yield p-type samples with transport characteristics dominated by shallow acceptor levels in reproducible concentrations. Also described is the continuing interest in establishing preparation conditions which are responsible for particular band edge emission spectra. All three of the above topics are relevant to the problem of developing a better understanding of acceptor levels in CdTe.

AD-616 609 Div. 9/4
CFSTI Prices: HC$1.00 MF$0.50

Institute of Tech., Univ. of Minnesota, Minneapolis.
FORMULATION OF STABILITY OF PLANE POISEUILLE FLOW WITH TEMPERATURE-DEPENDENT VARIABLE VISCOSITY,
by T. S. Fu. May 65, 18p Technical rept. TR-2
Contract Nonr71040

Unclassified report

Descriptors: (*Hydrodynamics, Thermodynamics), (*Thermodynamics, Viscosity), (*Laminar flow, Stability), Vortices, Velocity, Boundary layer, Incompressible flow, Partial differential equations, Reynolds number, Turbulence.

The present investigation is a preliminary effort toward understanding the effect of temperature-dependent variable viscosity on hydrodynamic stability. The flow pattern chosen in this work is plane Poiseuille flow which predicts no inviscid instability for constant viscosity. By taking into account the variation of viscosity, it is found that the velocity profile of the basic flow possess a vorticity maximum. This might suggest instability for large Reynolds number. The stability equations and the boundary conditions are derived to compare with those of constant viscosity. (Author)

AD-616 610 Div. 9/1
CFSTI Prices: HC$2.00 MF$0.50

Institute of Tech., Univ. of Minnesota, Minneapolis.
A STUDY OF BURGERS' MODEL EQUATION OF TURBULENCE,
by Dah-teng Jeng. May 65, 48p
Technical rept. TR-3
Contract Nonr71040

Unclassified report

Descriptors: (*Turbulence, Statistical analysis), Partial differential equations, Stochastic processes, Statistical processes, Functional analysis, Perturbation theory, Integration, Probability, Energy, Graphics, Digital computers.

Turbulence generated by Burger's model equation yielded good approximation to real turbulence. The energy spectrum fell off like k to the -2 power for times greater than 6 seconds. The energy spectrum of turbulence generated by the model equation was found to follow the k to the -2 power law. The spectrum obtained by the Wiener-Hermite expansion of the model equation and the spectrum of real turbulence show the same result. It was concluded that the probability distribution of turbulence velocity fields becomes almost Gaussian distribution even when starting with a non-Gaussian distribution. (Author)

AD-616 614 Div. 25/3
CFSTI Prices: HC$4.00 MF$1.00

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
THE DETERMINATION OF SPATIALLY NON-UNIFORM ELECTRON DENSITY DISTRIBUTION,
by Kurt A. Graf. Apr 65, 130p
Rept. no. UTIAS-108
Grants AF AFOSR366 63, AF AFOSR366 64
AFOSR 65-0935

Unclassified report

Descriptors: (*Electrons, Density), (*Plasma jets, Electrons), (*Probes(Electromagnetic), Plasma medium), Distribution, Argon, Mass spectrometer, Microwave equipment, Ions, Electron density, Plasma physics.

Electron densities were measured in the subsonic portion of a free-expansion argon jet by microwave and Langmuir probe methods. The electron density in the jet had a Gaussian radial distribution; along the axis of the jet the density fell off approximately exponentially. Microwave measurements were made by traversing the microwave beam across the jet. This allowed the spatial variation of electron density to be determined. The data were analysed with a ray-tracing technique. Langmuir probe measurements were made with cylindrical and flat probes under essentially collision free conditions and over a range of probe radius to Debye length ratios of about 10 to 50. Both electron and ion collection were measured and analysed. The electron-current part of the characteristic has, in the past, been interpreted in two different ways. These are the so-called 'deviation-from-linearity' method, and the 'two-tangent-intercept' method. For a probe in free-molecular flow, electron densities determined by these methods (for the

type of plasma under consideration and ideal probe characteristics) should not differ by more than about 30 percent. It was found, however, that the latter method gave values two or three times higher than the former method. (Author)

AD-616 621 Div. 20/2
CFSTI Prices: HC$1.00 MF$0.50

Minnesota Univ., Minneapolis.
SCATTERING OF LOW ENERGY K(-) MESONS BY NUCLEI,
by J. H. Hetherington, G. T. Condo, R. D. Hill, and R. M. Lansford. 1962, 9p
Unclassified report

Research done in cooperation with Dept. of Physics, Univ. of Illinois, Urbana.
Research supported in part by Office of Naval Research, Washington, D. C.

Descriptors: (*K mesons, Elastic scattering), (*Elastic scattering, K mesons), Meson scattering, Nuclei, Nuclear scattering, Differential cross section, Nuclear models.

Experiments on the elastic scattering of K(-) mesons by nuclei are described. In general, the interpretation of these experiments, based on the optical model, was that the real part of the K(-)-nucleus potential is attractive and of the order of 20 MeV. Since there appears to be some suggestion of a change in the depth of the potential with energy, investigation was made of the lowest practical K(-)-meson energies.

AD-616 629 Div. 20/1
CFSTI Prices: HC$7.00 MF$1.75

United Nuclear Corp., White Plains, N. Y.
Development Div.
NEUTRON CROSS SECTIONS OF U238, U235, U237, U239, U234, U236, Pu239, Pu240, W, Pb, Ni, Cr, C, Li6, Li7, AND T,
by M. C. Bertin, J. Celnik, H. Flesher, G. Grochowski, and M. H. Kalos. 31 Dec 64, 305p
Rept. no. UNC-5099
Contract DA18 108AMC131A, Proj. 2196
Unclassified report

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Descriptors: (*Neutron cross sections, Tables), Uranium, Isotopes, Plutonium, Tungsten, Lead, Nickel, Chromium, Carbon, Lithium, Tritium, Neutron scattering, Neutrons, X rays, Energy.

Neutron cross-section sets have been prepared for 16 elements or isotopes for neutron energies from 0.037 ev to 18 Mev. The cross sections tabulated include the total, elastic, inelastic, (n,2n), and fission cross sections, as well as cross sections for charged particle emission. Information is also given on the angular distribution of elastically scattered neutrons and on the energy distribution of neutrons and gamma rays following nonelastic scattering. (Author)

AD-616 636 Div. 25/3
CFSTI Prices: HC$6.00 MF$1.25

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
PLASMA PRODUCTION BY KINETIC IMPACT,
by S. J. Lukasik and B. J. Pernick. Feb 65, 219p Rept. no. 850
Contract DA30 069ORD3467, Proj. 414
Unclassified report

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Descriptors: (*Plasma medium, Production), (*Impact shock, Plasma medium), Ionization, Hypervelocity projectiles, Copper, Line spectrum, Continuous spectrum, Charges(Explosive), High-speed photography.

High speed photographic and time-resolved spectrographic observations were made of the head-on collision of two hypervelocity copper jets formed from metal-lined explosive charges. Framing camera observations of the collision in air and in a low pressure helium atmosphere indicate that a region of intense luminosity is created about the point of impact. The composition of the collision light over the visible region is that of a continuum with superposed copper spectral lines. A time-resolved spectral record in the 4400-5300A region of a collision in helium shows that an intense continuum first appears for about 5 micro-sec. The continuum intensity then decreases and a copper emission line spectrum emerges, consisting of both neutral and first-ionized copper lines. The ionized copper lines originate from energy levels that are about 25 ev above the neutral atom ground state. Several neutral copper lines are shown to possess combined instrumentation and resonance-broadened profiles. Estimates of the neutral copper atom density in the jet collision plasma are derived from line halfwidth measurements resulting from theoretical profile fits to the observed line shapes.

AD-616 637 Div. 25/2, 14/2
CFSTI Prices: HC$1.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
GROWTH AND CHARACTERIZATION OF BETA-SILICON CARBIDE SINGLE CRYSTALS,
Scientific rept. no. 1, May 64-Feb 65,
by Frank A. Halden, Arne Rosengreen, and Walter E. Nelson. May 65, 25p
Contract AF19 628 4910, Proj. 4608, Task 460805
AFCRL 65-206
Unclassified report

Descriptors: (*Silicon compounds, Carbides), (*Single crystals, Carbides), (*Crystal growth, Silicon compounds), (*Carbides, Single crystals), Crystallization, Surface properties, Resistance(Electrical), Graphite, Silicon, Melting, Hall effect, Measurement.

The process for growing beta-silicon carbide single crystals from solution in carbon-saturated silicon melts was examined to determine how larger crystals may be obtained. It appears that crystals grown to date have been limited in size by the small volume of the supersaturated zone provided for crystallization and by the presence of unstable boundary layers at the crystal growth interface. Means for removing these limitations are suggested. Further work on preparation of ohmic contacts on grown crystals, and on Hall measurements, has served to clarify many experimental limitations in working with very small crystals. Electron mobilities in the range of 500 to 900 sq cm/vsec were obtained on relatively large crystals having resistivities of about 0.1 ohm-cm. Smaller crystals having resistivities of approximately 1 ohm-cm had mobilities in the range of 1000 to 3000 sq cm/vsec. However, since on these crystals the size of contact spots is large compared with intercontact spacings and the correction factors thus affect the resultant value strongly, it is not at present possible to give precise values of mobility and resistivity. (Author)

AD-616 641 Div. 25/3
CFSTI Prices: HC$2.00 MF$0.50

Graduate Research Center of the Southwest, Dallas, Tex.
EXCITATION OF PLASMA RESONANCES BY A SMALL PULSED DIPOLE,
by W. D. Deering and J. A. Fejer. May 65, 43p
Grant NsG269 62 Unclassified report

Descriptors: (*Plasma oscillations, Resonance), (*Excitation, Resonance), (*Dipole antennas, Excitation), Magnetic fields, Electrostatics, Cyclotron resonance phenomena, Ionosphere, Fourier analysis.

The space and time dependence of decaying resonant oscillations excited in a collisionless plasma by an infinitesimally small pulsed dipole is determined, first in the absence and then in the presence of an external magnetic field. In the presence of a magnetic field only the 'quasi-electrostatic' resonances are treated. These occur at the plasma frequency, the electron cyclotron frequency F, the upper hybrid frequency, the lower hybrid resonant frequencies and at the frequencies nF where n is a positive integer. The quasi-electrostatic approximation is used in the treatment of these resonances; the limits of its validity are examined in some detail for the upper hybrid frequency resonance. No similar approximations are made for plasma oscillations in the absence of a magnetic field; the more accurate results so obtained differ little from those derived with the aid of the quasi-electrostatic approximation, within the region of interest.

AD-616 662 Div. 20/2, 20/5
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NEUTRON BRANCHING PROCESSES,
Revised ed.,
by T. W. Mullikin. 20 Dec 60, 33p Rept. no. P-1985
Unclassified report

Revision of rept. dated 23 May 60.

Descriptors: (*Neutron transport theory, Nuclear reactors), (*Nuclear reactors, Neutron transport theory), Mathematical models, Neutron flux, Iterative methods, Probability, Decay schemes.

The paper presents a study of the neutron population in a nuclear reactor as a branching process. Results are presented concerning the extinction probability of a supercritical reactor near the critical dimension, extending results of T. E. Harris. Parts of the theory of branching processes are presented; these are developed in a general setting in Harris's forthcoming monograph on this subject. The results of this paper apply to spheres, to infinite slabs, and to rods, with the assumptions that the neutron energy is constant and that the collision-fission process is isotropic. The assumption of homogeneity is also made, although similar results can be obtained in nonhomogeneous cases of restricted types; e.g., in the sphere the variation of physical properties should depend only on the radial coordinate. One consequence of this analysis is the determination of a new computational method for estimating the critical dimension and the steady-state flux for the above-mentioned reactors. This replaces the eigenvalue problem of transport theory by a nonlinear functional equation that can be solved by iteration. (Author)

AD-616 676 Div. 25/4, 30/5
CFSTI Prices: HC$3.00 MF$0.75

Michigan Univ., Ann Arbor. Infrared Lab.
TRANSMISSOMETER AND ATMOSPHERIC-TRANSMISSION STUDIES.
Final rept.,
by D. F. Fisher, E. C. Hall, G. H. Lindquist, J. P. Livisay, and G. W. Trytten. Mar 63, 80p
Rept. no. 4624-14-F2
Contract AF08 606 4735
ETR TR-65-8
Unclassified report

Descriptors: (*Wave transmission, Atmosphere), Measurement, Infrared transmitters, Interferometers, Photometer, Spectrum analyzers, Data, Test methods, Searchlights, Magnetic recording systems.

A transmissometer capable of measuring the spectral transmission of the atmosphere in the 0.5-15-micron region is described in this final report. The major components, which include two interferometer spectrometers, a visual photometer, and two 60-inch searchlights, are described in detail. The operation of the system is discussed first component by component, and then as a complete unit. A data-reduction system is described, and also a technique for using the transmissometer data to correct missile-radiation measurements. Engineering drawings, D measurements and design calculations are presented. (Author)

AD-616 680 Div. 25/6
CFSTI Prices: HC$3.00 MF$0.75

Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
STRENGTH OF LONGITUDINALLY STIFFENED PLATE PANELS WITH LARGE b/t,
by Tsuneo Tsuiji. Jun 65, 66p
Rept. no. 248.14
Contract Nobs90041
Unclassified report

Report on Built-Up Members in Plastic Design.

Descriptors: (*Panels(Structural), Loading(Mechanics)), Metal plates, Reinforcing materials, Stresses, Mathematical analysis, Structures, Thickness, Compressive properties, Failure(Mechanics).

An analytical investigation of the ultimate strength of longitudinally stiffened plate panels having large plate width to thickness ratios (plate buckles before the ultimate axial strength of panel is reached), and subjected to combined axial and uniformly distributed lateral loads is presented. Of interest in this study are stiffened panels as used in ship bottom plating. The emphasis is placed on the effect of lateral loads, residual stresses and b/t ratio on the ultimate axial strength of the panels. The results were obtained numerically on a digital computer. The following effects on the ultimate axial load were established: (1) Lateral loads cause a significant reduction. (2) Compressive residual stresses in the plate have reducing influence. (3) A large postbuckling strength can be expected for panels with large plate width to thickness ratios. A comparison between the analytical and test results shows that the method of analysis developed in this study can predict the ultimate strength of stiffened panels with relatively good accuracy. (Author)

AD-616 681 Div. 25/3
CFSTI Prices: HC$2.00 MF$0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
PLASMA PHYSICS.
Final technical summary rept.
30 Sep 64, 28p
Contract DA28 043AMC00073E, Proj. 3A99 25 004; ARPA Order 112 Unclassified report

Descriptors: (*Plasma medium, Stability), (*Electron beams, Plasma physics), Electrostatics, Gas ionization, Discharge tubes, Electron guns, Electrons, Density, Excitation.

The injection of relatively strong electron beams with large energy spread into a high density plasma gave no indication for an electrostatic instability of the beam. Anomalous energy losses of the beam at the onset of an instability are believed to be the stabilizing mechanism. Disappearance of the excitation light of the beam at a critical electron density was, however, observed. The origin of this effect is not understood at the present time. (Author)

AD-616 682 Div. 25/4
CFSTI Prices: HC$1.00 MF$0.50

Institute of Optics, Univ. of Rochester, N. Y.
BASIC RESEARCH IN OPTICS.
Final rept. for 1 Feb 63-31 Jan 65,
by K. Teegarden. 31 Jan 65, 5p
Grant AF AFOSR236 63

Unclassified report

Descriptors: (*Optical phenomena, Scientific research), (*Helium group gases, Optical properties), (*Alkali metal compounds, Optical properties), Solified gases, Electron transitions, Interference, Halides, Absorption spectrum, Impurities.

A brief summary is given of research projects concerning various optical phenomena in solid rare gases and in alkali halides.

AD-616 683 Div. 25/2, 25/6
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MULTIPHONON PROCESSES IN THE PHOTOCONDUCTIVITY OF CADMIUM SULFIDE AND CADMIUM SELENIDE SINGLE CRYSTALS.
Master's thesis,
by James Albert Bell. Mar 65, 87p
Rept. no. GSP-65A

Unclassified report

Descriptors: (*Photoconductivity, Cadmium compounds), (*Cadmium compounds, Photoconductivity), (*Sulfides, Cadmium compounds), (*Selenides, Cadmium compounds), (*Single crystals, Cadmium compounds), Cryogenics, Phonons, Measurement, Semiconductors, Electric currents, Crystal lattices, Atomic energy levels, Electron transitions, Excitation.

The photoconductivity of single crystals of CdS and CdSe was investigated at 4.2K to ascertain whether the multiphonon process does exist in CdSe, to provide additional evidence of this previously observed phenomenon in CdS, and to show that similar electron and phonon processes were responsible for the multiphonon process in both crystals. Photoconductivity was induced with monochromatic light provided by a 1000 watt tungsten source coupled with a grating monochromator. The photocurrents were measured by a variable electrometer and simultaneously plotted against exciting photon energies by an x-y recorder. Analysis of data has indicated that the multiphonon process does exist in CdSe and that the multiphonon process in both CdS and CdSe can be attributed to similar electron and phonon processes. It was observed in the CdSe data that both free exciton and bound exciton states could act as recombination centers for the multiphonon process; only free excitons seemed to do so in CdS. (Author)

AD-616 684 Div. 25/6
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
LENGTH CHANGE MEASUREMENTS OF ELECTRON IRRADIATED CADMIUM SULFIDE IN THE ENERGY RANGE 275-935 KEV.
Master's thesis,
by Stephen Pierce Richard. Jun 65, 73p
Rept. no. GSP-65B

Unclassified report

Descriptors: (*Single crystals, Electron bombardment), (*Cadmium compounds, Sulfides), (*Electron bombardment, Single crystals), Crystal lattice defects, Impurities, Cryogenics, Temperature, Semiconductors, Sulfur, Deformation, Measurement.

Single crystal cadmium sulfide was bombarded with 275-935 keV electrons from a Van de Graaff accelerator and the change in length was observed at room (295K) and liquid nitrogen (77K) temperatures. The crystal showed a barely detectable change in length, (-5.7±7.6) X 10 to the minus 22nd power per electron per sq cm, when bombarded with electrons below the cadmium displacement threshold at 295K. Above the cadmium threshold an initial contraction not predicted by the simple displacement theory of the order of (-6.0 X 0.001) was observed. After the initial contraction, at 550 keV the length change was (+1.0±9.8) X 10 to the minus 23rd power per electron per sq cm, while at 755 and 935 keV, the length changes were (+4.6±1.5) X 10 to the minus 22nd power per electron per sq cm and (-1.5±2.6) X 10 to the minus 22nd power per electron per sq cm, respectively. These length changes show the effect of an annealing stage which becomes dominant at large concentrations of displaced cadmium atoms. The 77K bombardments at 275 and 755 keV show contractions of (-1.8±0.6) X 10 to the minus 22nd power per electron per sq cm and (-2.9±1.3) X 10 to the minus 21st power per electron per sq cm, respectively, which are postulated as caused by the diffusion of interstitials through the lattice and the subsequent accumulation of vacancies. (Author)

AD-616 685 Div. 25/4, 25/7
CFSTI Prices: HC$4.00 MF$1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
TEMPORAL DISTURBANCES IN INTERFEROMETRIC SPECTROSCOPY.
Master's thesis,
by William Paul Chandler. Mar 65, 132p
Rept. no. SP/PH/65-6

Unclassified report

Descriptors: (*Interferometers, Noise), (*Spectroscopy, Noise), (*Infrared spectroscopy, Noise), Spectrum analyzers, Integral transforms, Calibration, Modulation, Blackbody radiation, Lasers, Moon, Condensation trails, Spectra(Infrared).

An experimental study is reported of temporal disturbances in interferometric spectroscopy. Using a Michelson interferometer, with a sweep length and sweep time of 200 microsec and 0.2 sec respectively, interferometer noise, the false spectra caused by source intensity modulations, and white noise vibrations were studied. Using a wave analyzer reduction of the interferograms and assuming a 90 degree phase difference between the interferometer source frequencies and the modulation frequencies, the false spectra was subtracted from the true spectra. The accuracy of this subtraction was then correlated to a signal to modulation ratio. There is also extensive coverage of the laboratory techniques developed for near infrared measurements in interferometric spectroscopy. (Author)

AD-616 687 Div. 25/6, 20/1
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MEASUREMENT OF ELECTRON FREE LIFETIME AND TRAPPING FACTOR IN HIGH PURITY CADMIUM SULFIDE, CADMIUM SULFIDE/SELENIDE AND CADMIUM SELENIDE USING THE METHOD OF ULTRASONIC AMPLIFICATION.
Master's thesis,
by Barton Krawetz. Mar 65, 99p
Rept. no. SP/PH/65-13

Unclassified report

Descriptors: (*Semiconductors, Transport properties), (*Cadmium compounds, Transport properties), (*Sulfides, Transport properties), (*Selenides, Transport properties), Test methods, Ultrasonic radiation, Electron transitions, Stresses, Mechanical waves, Single crystals, Oxides, Crystal growth, Photoconductivity, Absorption, Propagation, Attenuation, Amplifiers, Hall effect, Acoustics, Cadmium alloys, Selenium alloys.

Cadmium sulfide, cadmium sulfide/selenide, and cadmium selenide were studied in an effort to arrive at estimates of several electron transport parameters. Electron free lifetimes, trapping factors, and effective drift mobility were all deduced from direct measurement of the variation of stress wave gain with applied electric field and Hall mobility. Attempts to isolate the characteristic energy level structure of high quality amplifier crystals were made by means of photoconductivity and absorption measurements at both 77K and 300K. These methods, in general, failed to indicate any peculiarities which could be readily correlated with amplifier performance. The one exception, a sample of CdS compensated in selenium, showed a severe decrease in slope and a broadening of the primary absorption edge. During attempts to compensate CdS in flowing oxygen, it was discovered that 3 mm. cubic crystals formed on that portion of the CdS directly exposed to the oxygen source. X-ray powder measurements confirmed that these crystals were CdO.

AD-616 688 Div. 25/2, 25/6, 15/1
CFSTI Prices: HC$4.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DERIVATION OF AN INTERSTITIAL POTENTIAL FUNCTION FOR A FACE-CENTERED CUBIC CRYSTAL FROM FIRST PRINCIPLES.
Master's thesis,
by John Eugene Wrobel, Jr. Feb 65, 114p
Rept. no. SP/PH/65-20

Unclassified report

Descriptors: (*Crystal lattices, Potential theory), Functions, Fourier analysis, Polynomials, Harmonic analysis, Series, Crystal substructure, Vector analysis, Bessel functions.

An interstitial potential function for an fcc crystal was derived by series expansions of 1/r in terms of Fourier exponentials, Legendre polynomials and cubic harmonics of the type alpha. In particular, a function having the form of an empirical function suggested by J. C. Slater and P. DeCicco of M.I.T. was derived by the series expansions. This derived function not only gives the Slater-DeCicco empirical constants in terms of known functions, but also generates higher order terms. The series expansion for the interstitial potential is found to converge very poorly. For example, after five hundred terms, it is convergent to only three significant places. Furthermore, the function is not entirely analytical, being expressed in terms of the number of lattice points in an fcc reciprocal lattice for a given wave vector magnitude. These numbers are not analytical functions of the wave vectors but a simple method for determining them is given. (Author)

AD-616 689 Div. 25/3
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
IONIZATION WAVES IN A LONGITUDINAL MAGNETIC FIELD.
Master's thesis,
by William P. Burckel. Feb 65, 100p
Rept. no. GS/PH/65-3

Unclassified report

Descriptors: (*Glow discharges, Magnetic fields), (*Magnetic fields, Glow discharges), Gas ionization, Plasma physics, Electron density, Helium, Argon, Neon.

The effects of a longitudinal magnetic field (0 to 850 gauss) on running striations occurring in low pressure (0.1 to 2.0 mm Hg) glow discharges of Helium, Neon and Argon were studied. Also the electron temperature and the charge density profiles of particular striations were determined by Langmuir probe techniques. The variation of the striation parameters of wavelength, velocity and frequency were found to be oscillatory with the magnetic field intensity. The theory which was used to describe striations in a longitudinal magnetic field was found to be inadequate for the experiments. This was probably because the theory neglects end conditions which seemed to dominate in the short discharges studied. Other oscillations were also detected and found to be a result and a function of the magnetic field. The probe measurements showed the light intensity wave of the striation to be in phase with the charge density wave with the electron temperature wave leading by less than 90 degrees. (Author)

AD-616 690 Div. 25/3
CFSTI Prices: HC$4.00 MF$1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SYNTHESIS OF ARBITRARY-AXIAL-MAGNETIC FIELDS WITH STANDARD COILS.
Master's thesis,
by David Brittain Taylor. Jun 65, 120p
Rept. no. GSP/PH/65-18

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Magnetic fields, Synthesis), (*Magnet coils, Alignment), Least squares method, Matrix algebra, Integration, Programming(Computers).

A method to synthesize an axial-homogeneous field is presented in which any number of standard coils may be positioned so as to describe any arbitrary magnetic field. The fields of standard coils are fit to a predetermined field by the method of least squares. Computer solutions predict a ripple along the axis of 1.25 percent for 13 coils over 2.26 meters. Experimental tests verify the solution. Off axis ripple is predicted by the equation B(r,o) = C sub 1 I sub o (2 pi r/1 sub o) which holds for constant fields. Computer codes to solve the entire problem are presented in the appendixes. (Author)

AD-616 691 Div. 25/7, 20/2
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A BETA-RAY SPECTROMETER FOR CONVERSION ELECTRON STUDIES.
Master's thesis,
by Charles Delu David, Jr. Feb 65, 67p
Rept. no. SP/PH/65-7 Unclassified report

Descriptors: (*Nuclear radiation spectrometers, Electrons), (*Electrons, Internal conversion), (*Beta-ray spectroscopy, Internal conversion), Atoms, Nuclei, Atomic energy levels, Van de Graff generators, Ground state, Excitation, Isotopes, Gold, Cesium, Bismuth, Barium, Fluorine, Calcium compounds, Fluorides.

A double-focusing, magnetic beta-ray spectrometer was assembled, calibrated, and used to find conversion electrons in light (Z < 20) nuclei. A 2 MeV Van de Graaff accelerator was connected to the spectrometer via drift tubes. Various beam handling and monitoring devices were designed and constructed; included were a magnetic quadrupole focusing lens, beam deflecting magnets, target chamber, and Faraday Cup. The spectrometer's field was measured with a rotating coil magnetometer, and a solid state detection system was used. The spectrometer was calibrated with Cs-137 and Bi-207 sources and was found to be linear to within 6 parts in 10,000; the resolution of the 624 keV transition in Ba-137 was 0.24%. A water cooled, CaF2 target was bombarded with 873 keV protons, and conversion electrons corresponding to the transition from the second excited state to ground state in F-19 were measured. The second excited state in F-19 was found to be 198.6 ± 0.4 keV above the ground state. (Author)

AD-616 706 Div. 25/4
CFSTI Prices: HC$2.00 MF$0.50

Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
RAYLEIGH SCATTERING OF COHERENT LIGHT BY GASES,
by H. J. Watson, R. R. Mitchell, and J. R. Thornton.
Feb 65, 40p Technical note R-135
Unclassified report

Descriptors: (*Lasers, Optical phenomena), (*Light, Scattering), (*Gases, Optical properties), Argon, Nitrogen, Oxygen, Air, Probability, Particles.

The experiment was designed to study Rayleigh scattering using laser light (6943A) and to determine if the laser can be used as a diagnostic tool to determine scattering center density. The scattered light intensity from argon, oxygen, nitrogen and air was observed. The angular dependence of scattered light intensity for different polarizations of the incident laser beam was observed for argon gas, and a linear relationship between scattered intensity and pressure exists for all gases studied. The relative differential scattering cross sections for argon, nitrogen and oxygen were determined and compared with different theoretical predictions. The combined results indicate that it is possible to determine densities within reasonable accuracy between one atmosphere and ten microns under the conditions of this experimental arrangement. The problems of observations and the limitation of this technique are discussed. (Author)

AD-616 707 Div. 25/4
CFSTI Prices: HC$3.00 MF$0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MATHEMATICAL MODEL OF A TRAVELING WAVE LIGHT AMPLIFIER IN A TRIANGULAR CONFIGURATION.
Master's thesis,
by John Allan Love. Jun 65, 100p
Rept. no. GSP/Phys/65-14
Unclassified report

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Descriptors: (*Lasers, Prismatic bodies), Mathematical models, Analysis, Programming computers, Pumping-(Electronics), Ruby, Calcium compounds, Tungstates, Neodymium, Impurities, Light pulses, Experimental data.

A traveling wave optical maser(TWOM) was placed in a recirculating configuration to make multipass amplification possible. This configuration was analyzed from two different viewpoints. First, a computer analysis was performed to determine the change of the population inversion in the amplifying medium and the output photon flux as the input signal travels through the medium. Specifically, the resulting two coupled rate equations were solved using material-cavity parameters corresponding to neodymium-doped calcium tungstate in a cavity 40 nanoseconds in length. It was found that only under constant high pumping rates and in short cavity path lengths will the returned output energy be amplified again. It was predicted that not only does pulse sharpening occur, but the leading edge of the output pulse contains an initial low-power spike. Second, an experiment was performed utilizing ruby for both the oscillator and the amplifier. Amplification of the order of 30 db occured, but the existence of pulse sharpening was not conclusive. No pre-spiking was observed. (Author)

AD-616 708 Div. 25/3
CFSTI Prices: HC$5.00 MF$1.25

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ON THE RETROGRADE MOTION OF A LOW PRESSURE ARC DISCHARGE IN A TRANSVERSE MAGNETIC FIELD.
Master's thesis,
by Hugo Weichel. Jun 65, 181p
Rept. no. GSP/PH/65-19
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Electric discharges, Motion), (*Electric arcs, Motion), (*Magnetic fields, Electric discharges), Plasma medium, Reviews, Theory, Hall effect, Electrodes, Evaporation, Surface properties, Magnetic coils, Copper, Ions.

A comprehensive and up-to-date literature survey is presented on the unorthodox motion of a low pressure arc discharge in a transverse magnetic field. As a result of the present experimental and theoretical investigation additional information is presented, and a new hypothesis, based on a combination of the Hall effect, evaporation of the cathode, and the electrode surface condition, is proposed in an effort to explain the retrograde motion of an arc discharge.

AD-616 709 Div. 8/6, 2/7
CFSTI Prices: HC$5.00 MF$1.25

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
FREQUENCY DEPENDENCE OF IONOSPHERIC ABSORPTION.

Master's thesis,
by Julio Edgardo Barety. Jun 65, 186p
Rept. no. SP/PH/65-1
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Ionosphere, Absorption(Physical)), (*Ionospheric propagation, Frequency), (*Radio waves, Ionospheric propagation), Electron density, Magnetic fields, Radio waves, Extraterrestrial radio waves, Electrons, Equations.

The magneto-ionic theory is examined in its relation to absorption calculations. For representative profiles the complex index of refraction was computed using the Appleton-Hartree and Sen-Wyller magneto-ionic formulas. The height profiles of the real and imaginary part of the index of refraction are plotted and the absorption corresponding to day-time and night-time conditions is computed and its frequency dependence determined. It is determined that absorption for general conditions also follows closely an inverse square law, although there are deviations, particularly for the extraordinary ray. It is determined that general propagation conditions do not affect radically the possible use of differential absorption for total absorption measurements. A possible method for doing this is given. The variation of the absorption coefficient as a function of parameter N is also determined and a linearity condition is shown to hold under certain conditions for general propagation conditions. (Author)

AD-616 710 Div. 25/6, 25/3, 8/7
CFSTI Prices: HC$4.00 MF$1.00

University of Southern California, Los Angeles. Electronic Sciences Lab.
ELECTRONIC SCIENCES CONSOLIDATED REPORT: SOLID STATE PHYSICS, ELECTROMAGNETIC THEORY, PLASMA PHYSICS, AND INFORMATION SCIENCE.
Consolidated semiannual progress rept. no. 1, 1 Oct 64-30 Mar 65,
30 Mar 65, 138p
Unclassified report

Descriptors: (*Solid state physics, Crystallography), (*Electromagnetism, Theory), (*Plasma physics, Electromagnetic waves), (*Communication theory, Data processing systems), Semiconductors, Magnetism, Crystal lattice defects, Superconductivity, Plasma medium, Millimeter waves, Radio astronomy, Control systems, Detection, Computers, Coding.

Contents:
Semiconductors, magnetism, imperfections in crystals, superconductivity, plasmas, radiation and diffraction of electromagnetic waves, propagation of electromagnetic waves, millimeter waves, control systems, information processing and signal detection, hybrid computation, coding theory, optical processing.

AD-616 741 Div. 20/9, 20/5
CFSTI Prices: HC$1.00 MF$0.50

Nuclide Corp., State College, Pa.
VACUUM VIBRATOR ION SOURCE, PHASE II.
Final rept. for Mar 64-Feb 65,
by L. A. Cambey and T. J. Hovick. Mar 65, 24p
Contract AF33 657 11041, Proj. 7360, Task 736005
ML TR-65-81
Unclassified report

See also AD-434 675.

Descriptors: (*Ion sources, Vibrators(Electrical)), (*Vibrators(Electrical), Ion sources), Vacuum apparatus, Mass spectroscopy, Spectrum analyzers, Ionization, Conductivity.

Two types of vacuum vibrator sources have been developed. Conventional magnetic types operated at several hundred cps and stepped horn resonator systems operated at frequencies of 15 to 60 Kcps. Both types performed satisfactorily under test. A study of characteristics of the sources was carried out. A comparison between the properties of the vacuum vibrator and the conventional radio-frequency spark showed that almost all of the advantages were in favor of the vacuum vibrator. These included higher and more stable ion currents, lower energy spread, smaller sample consumption, easier to operate and less equipment required. The main disadvantage is that the multiply charged ions are more abundant. This, of course, is sometimes an asset. Techniques were developed for the ionization of nonconductors with the vacuum vibrator source. (Author)

AD-616 743 Div. 8/6, 7/5, 25/3
CFSTI Prices: HC$2.00 MF$0.50

Microwave Lab., Stanford Univ., Calif.
MILLIMETER GENERATION AND NONLINEAR PROPAGATION IN FERROMAGNETICS.
Rept. no. 8 (Final), 1 Jul-30 Sep 64.
Apr 65, 38p Rept. no. ML-1313
Contract DA36 039AMC00041E, Proj. 1G6 2201A055 05
Unclassified report

Descriptors: (*Millimeter waves, Waveform generators), (*Ferromagnetic materials, Millimeter waves), Propagation, Pulse generators, Switching circuits, Coupling circuits, Magnetic fields.

An investigation of pressurized nitrogen primary spark gaps, which was started during the preceding quarter, was completed during the last quarter, together with various related components. These were found to overcome difficulties experienced earlier in the year with atmospheric pressure gaps, and to provide substantially improved pulsed field waveforms. An investigation of resonant-slot output coupling circuits, begun during the past quarter, was completed. Bench testing of prototypes and construction of final models were carried out. Construction is nearly complete on an experimental type II generator, which will be tested during the coming quarter. (Author)

AD-616 747 Div. 25/6, 25/8
CFSTI Prices: HC$3.00 MF$0.75

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
WAVES IN MATERIALS WITH MEMORY. IV. THERMODYNAMICS AND THE VELOCITY OF GENERAL ACCELERATION WAVES.
Technical rept.,
by Bernard D. Coleman and Morton E. Gurtin.
8 Mar 65, 57p Rept. no. TR-99
Contract Nonr562 10, Proj. NR064 406
Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Thermodynamics, Materials), (*Hysteresis, Mechanical waves), (*Tensor analysis, Mechanical waves), Viscoelasticity, Acceleration, Stresses, Elasticity, Entropy, Thermal conductivity, Field theory.

Wave propagation in general materials with memory is discussed. It is shown that the theory of acceleration

waves in such materials can be based on the notion of an instantaneous acoustic tensor. It is proven that the Second Law of Thermodynamics implies the symmetry of this acoustic tensor.

AD-616 748 Div. 25/6, 25/8
CFSTI Prices: HC$1.00 MF$0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
THERMODYNAMICS AND WAVE PROPAGATION.
Technical rept.,
by Bernard D. Coleman and Morton E. Gurtin. Apr 65, 20p Rept. no. TR-100
Contract Nonr562 10, Proj. NR064 406
Unclassified report

Descriptors: (*Thermodynamics, Mechanical waves), (*Mechanical waves, Propagation), Viscoelasticity, Hysteresis, Materials, Stresses, Tensor analysis, Continuum mechanics, Elasticity, Field theory, Entropy.

Some aspects of the classical theory of wave propagation in finitely deformed elastic materials are discussed. Recent extensions of the classical theory to materials with memory are discussed. (Author)

AD-616 756 Div. 25/3
CFSTI Prices: HC$1.00 MF$0.50

Maryland Univ., College Park.
(PLASMA PHYSICS)
Status rept. for 1 Mar-31 May 65,
by Hans R. Griem. 31 May 65, 7p
Contract Nonr59510
Unclassified report

Descriptors: (*Plasmic physics, Scientific research), Line spectrum, Ultraviolet spectroscopy, Helium, Nitrogen, Shock waves, Shock tubes, Probes(Electromagnetic), Lasers, Atomic properties.

Contents: Measurement of Stark broadening of lines from light elements, measurement of ultraviolet radiation from shock-heated plasmas, collisionless plasma shock wave experiment, and plasma diagnostics by light scattering.

AD-616 763 Div. 25/7, 4/4

Edward Davies Chemical Lab., University Coll. of Wales, Aberysthwyth.
INFRA-RED, ULTRASONIC AND THEORETICAL STUDIES OF MOLECULAR STRUCTURE.
Final scientific rept. for 1 Mar 63-28 Feb 65,
by W. J. Orville-Thomas. 28 Feb 65, 8p
Contract AF61 052 691
AFCRL 65-389
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Molecular structure, Analysis), (*Infrared spectroscopy, Molecular structure), (*Ultrasonic radiation, Molecular structure), Molecular properties, Theory, Chemical bonds, Infrared phenomena, Absorption spectrum, Sound, Attenuation, Great Britain.

Results of studies in the following areas are briefly summarized: infrared dispersion curves for simple methyl derivatives; infrared absorption of simple polyatomic molecules; attenuation of ultrasonic energy by equilibrium mixtures of rotational isomers; calculation of various intramolecular parimeter. A list of publications generated under the contract is included.

AD-616 764 Div. 25/6, 25/3
CFSTI Prices: HC$3.00 MF$0.75

Brown Univ., Providence, R. I.
AN INVESTIGATION OF THE PHOTOVOLTAIC EFFECT ASSOCIATED WITH A LIFETIME GRADIENT IN A SEMICONDUCTOR.
Interim rept.,
by Ralph M. Esposito. Apr 65, 72p
Contract AF 33 657 8974, Proj. 7885, Task 788501
ARL 65-74
Unclassified report

Descriptors: (*Photoelectric effect, Semiconductors), (*Semiconductors, Photoelectric effect), Photoconductivity, Diffusion, Impurities, Proton bombardment, Electron bombardment, Van de Graff generators, Resistance(Electrical), Silicon.

The photovoltage due to a lifetime gradient in a semiconductor is investigated. Equations for small signal and large signal cases are presented. Methods of producing lifetime changes are discussed. These include diffusion of impurities and irradiation by high energy particles. Attempts were made to observe the effect as produced by the latter method. Types of bombarding particles included 300 KeV protons, 400 KeV electrons and 3 MeV electrons. The result of each attempt is discussed in detail. An effect whose origin has not been unequivocally established has been observed. Its sign is opposite to that predicted by theory for the lifetime effect. Calculations indicate that it is probably not caused by resistivity differences between the two sections of the sample. Suggestions are offered for possible future experiments. (Author)

AD-616 766 Div. 25/7
CFSTI Prices: HC$1.00 MF$0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE EFFECT OF CHEMICAL COMBINATION ON THE X-RAY K EMISSION SPECTRA OF OXYGEN AND FLUORINE.
Final rept. for Jun-Nov 64,
by David W. Fischer. Apr 65, 23p Rept. no. ML-TR-65-58
Proj. 7367, Task 736702
Unclassified report

Descriptors: (*Oxygen, X-ray spectrum), (*Fluorine, X-ray spectrum), (*X-ray spectroscopy, Band spectrum), Bandwidth, Intensity, Oxides, Fluorides, Microwave spectroscopy), Chemical bonds, Crystal structure, Electron transitions, Atomic energy levels.

Band shapes, wavelengths, and intensities are presented and discussed for the K emission spectra of oxygen and fluorine from some simple oxides and fluorides. It is shown that band shapes and peak positions are dependent upon the target material from which they are emitted. Evidence is presented illustrating that this dependence is in part due to such solid state properties as crystal structure, valence, and coordination. Results were obtained from a flat crystal vacuum spectrometer with a thin window flow proportional counter using electron excitation. (Author)

AD-616 778 Div. 25/4, 2/9
CFSTI Prices: HC$3.00 MF$0.75

Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF THE VERTICAL VARIATION OF LIGHT SCATTERING IN MONTEREY BAY, CALIFORNIA.
Master's thesis,
by Charles H. Bassett, Jr. and Harry C. Furminger.
1965, 97p
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Light, Scattering), (*Sea water, Light transmission), California, Salinity, Attenuation, Phosphates, Determination.

An investigation of the vertical variations of the scattering coefficients for visible light at a selected location in Monterey Bay, California, was conducted during December, 1964, January and February, 1965. Forty-six water samples were collected at various depths on five separate sampling days. Where possible, concurrent light attenuation (horizontal) and solar light extinction measurements were made in situ. The water samples collected were analyzed for density and inorganic phosphates. From the scattering coefficients computed, and hand-fitting of scattering function curves with theoretical curves, the particle size and particle concentration was estimated for each sample. The relationships between the sea water density, phosphate content, and the empirically derived scattering coefficient, particle size, and particle concentration were examined. The only significant correlation found is that between particle size and particle concentration. A particle concentration maximum was observed above and adjacent to the pycnocline where one existed. (Author)

AD-616 782 Div. 25/5, 4/4
CFSTI Prices: HC$3.00 MF$0.75

Philipps-Universitat, Marburg (West Germany). Inst. fur Theoretische Physik.
FLUCTUATION IN GASES. MATHEMATICAL PROBLEMS IN QUANTUM FIELD THEORY.
Final rept.,
by G. Ludwig. 1 Jan 65, 79p
Contract AF61 052 658
AFOSR 65-0652
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Field theory, Mathematics), (*Gases, Quantum mechanics), Boundary value problems, Groups(Mathematics), Statistical mechanics, Probability, West Germany.

AD-616 788 Div. 25/6, 25/7, 20/5
CFSTI Prices: HC$2.00 MF$0.50

Minnesota Univ., Minneapolis.
ELECTRON SPIN RESONANCE STUDIES OF SELECTED SOLIDS.
Final rept.,
by T. M. Sanders, Jr. 1961, 39p
Contract AF49 638 811
AFOSR 65-0852 Unclassified report

Descriptors: (*Nuclear spin resonance, Solids), (*Antimony, Nuclear spin resonance), (*Germanium, Impurities), (*Polyethylene plastics, Proton bombardment), (*Particle accelerator targets, Polyethylene plastics), Electrons, Semiconductors, Piezoelectric effect, Atomic orbitals, Phosphorus, Line spectrum, Strain(Mechanics), Protons, Polarization.

Electron spin resonance experiments on shallow donors in germanium are reported. The experiments consist in measurement of the Zeeman effect of the donors as a function of applied /110/ compression. From the data a value may be derived for the valley-orbit (singlet-triplet) splitting (4Dc) of the donor ground state. The results for P donors agree with determinations by other workers. The result for Sb in Ge is $4Dc = (4.04 \pm 0.1) \times 0.0001$ ev. This result is not consistent with the value obtained from piezo-resistance measurements. The data also require that the singlet state lie below the triplet in Sb-donors, just as in P and As donors. An additional four-line spin resonance spectrum in Sb-doped Ge is ascribed to donors located near the surface of the samples, in regions of high local strain. Studies concerning proton polarization in polyethylene targets are also reported. (Author)

AD-616 789 Div. 25/3
CFSTI Prices: HC$3.00 MF$0.75

Northwestern Univ., Evanston, Ill. Gas Dynamics Lab.
TWO-DIMENSIONAL HEATED JET WITH AN ARBITRARY PRANDTL NUMBER AND MAGNETOGASDYNAMIC FREE JET.
Scientific rept.,
by David C. Smith and Ali Bulent Cambel. Oct 64, 58p
Rept. no. NU-GDL-B-2-64
Grants AF AFOSR62 307, AF AFOSR63 329, Proj. 9751, Task 9751 01
AFOSR 65-0926
Unclassified report

Descriptors: (*Magnetohydrodynamics, Mathematical analysis), (*Plasma jets, Fluid dynamic properties), Electric fields, Magnetic fields, Laminar flow, Two-dimensional flow, Compressible flow, Momentum, Energy, Velocity, Temperature, Ionization, Perturbation theory, Subsonic flow.

Most of the existing solutions to the free jet problem are restricted by assumptions of constant viscosity, a unitary Prandtl number and incompressible fluids. The solution of the 2-dimensional, laminar jet of a compressible fluid with an arbitrary Prandtl number is presented for subsonic flow. A solution is also obtained for any Mach number flow for a Prandtl number of 1. The laminar, compressible, two-dimensional jet of an electrically conducting fluid with an applied transverse magnetic field is solved by a perturbation technique. The perturbation parameter is the non-dimensional ratio of the magnetic force to the inertia force of the jet. The velocity and temperature distributions are found in closed form to first order in the perturbation parameter. The velocity profiles are also obtained, to first order, for an electric field applied in a direction normal to both the magnetic field and the axial direction. The solution is valid for an electric field that is the same order of magnitude as the v x B force. (Author)

AD-616 804 Div. 25/3, 30/5

Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
KINETIC THEORY APPROACH TO ELECTROSTATIC PROBES,
by Eliahu Wasserstrom, C. H. Su, and Ronald F. Probstein. 17 Sep 64, 16p
Contract Nonr184193
Unclassified report

Pub. in Physics of Fluids v8 n1 p56-72 Jan 1965

(Copies not available to DDC or Clearinghouse customers).
Revision of manuscript received 25 May 64.

Descriptors: (*Probes(Electromagnetic), Kinetic theory), (*Kinetic theory, Probes(Electromagnetic), Plasma physics, Electrostatics, Charged particles, Particle trajectories, Statistical functions, Differential equations.

A spherical electrostatic (Langmuir) probe in a slightly ionized plasma is studied from a kinetic theory point of view. The two-sided distribution function method of Lees, which embodies the Mott-Smith approach, is used. The velocity space is divided into two regions along the straight cone tangent to the spherical probe, and different distribution functions are defined in the two regions. On satisfying the two relevant moments of the distribution function (continuity and number density flux) three simultaneous ordinary nonlinear differential equations, which are appropriate to all values of the Debye length, collision mean free path and probe potential, are obtained for determining the ion and electron number densities, and the potential. These equations reduce to the usual linear flux equations when the mean free path is much shorter than the probe radius and the Debye length. The equations are first linearized and solved for the case of small probe potential. Explicit solutions are given for the current-voltage characteristics and the distributions of the number densities and the potential. The general case of arbitrary probe potential is also studied. Results for the characteristics and for the potential drop in the sheath are presented for some representative cases. (Author)

AD-616 806 Div. 25/6, 25/1, 20/3, 17/2

Naval Ordnance Test Station, China Lake, Calif.
NEUTRON-ACOUSTIC IRRADIATION OF ALUMINUM SINGLE CRYSTALS,
by B. Langenecker and C. W. Fountain. 28 May 64, 10p Rept. no. NOTS TP-3825
NAVWEPS 8753
Unclassified report

Pub. in Philosophical Magazine v11 n111 p513-9 Mar 1965.
(Copies available only to DDC users).

Descriptors: (*Single crystals, Aluminum), (*Aluminum, Hardening), (*Ultrasonic radiation, Aluminum), (*Neutrons, Radiation damage), Acoustics, Crystal lattice defects, Shear stresses, Resistance(Electrical).

Ultrasonic irradiation of approx. 25 w/sq cm at 20 kc may increase the critical resolved shear stress by a factor of 4 in 99.999% pure aluminium single crystals. This acoustic hardening is accompanied by a yield-point phenomenon, which, in its graphical appearance, resembles effects by neutron irradiation with no sound applied. Hardening by ultrasound and by neutron irradiation are compared, and effects of the superposition of fast neutrons and intense ultrasound in aluminium single crystals having diameters between 0.6 and 1.5 mm are presented. Increases were found to amount to as much as a factor of 14 in the critical resolved shear stress of these crystals compared to untreated samples. Simultaneously, the electric resistivity increased with combined treatment by 3.2 times over untreated samples. The results from these investigations are discussed in the light of present theories of neutron and acoustic radiation damage. (Author)

AD-616 809 Div. 8/6, 12/2, 2/7

Air Force Cambridge Research Labs., Bedford, Mass.
A SYNOPTIC STUDY OF SCINTILLATIONS OF IONOSPHERIC ORIGIN IN SATELLITE SIGNALS.
Environmental research papers,
by J. Aarons and J. Mullen. 21 Aug 64, 18p
Rept. nos. AFCRL 65-237; ERP-94
Proj. 4643
Unclassified report

Pub. in Planetary Space Science v13 p51-62 1965
(Copies available only to DDC users).

Descriptors: (*Ionospheric disturbances, Radio signals), (*Satellites (Artificial), Radio signals), Very high frequency, Terrestrial magnetism, Ionospheric propagation.

Observations of scintillated 54 Mc signals from the satellite Transit IVA have been made for the past two years at seven laboratories in Europe and one in the U.S. Analysis of these data shows effects at mid-latitudes which are parallel to those found previously in geomagnetically similar areas. Lower latitude observatories show low indices of scintillation and little variation of scintillation index with latitude. High latitude observations show the distinct effects present in auroral regions, high indices being recorded most of the time with the highest being overhead and decreasing to the south. At these latitudes effects of zenith angle are less than those due to latitude variation. At middle and lower latitudes there is a symmetrical zenith angle dependence. Frequency distributions of the indices versus latitude at one location show that at lower latitudes the fall off roughly exponentially from a peak near zero while at higher latitudes the shape of the distribution favors the high indices. (Author)

AD-616 815 Div. 25/5, 15/1

Theoretical Chemistry Inst., Univ. of Wisconsin, Madison.
APPRAISAL OF THE FOPIM FAST-CONVERGING PERTURBATION METHOD,
by Peter D. Robinson, John H. Huntington, and Joseph O. Hirschfelder. 27 Nov 64, 5p
Grant NsG275 62 Unclassified report

Pub. in The Journal of Chemical Physics v42 n6 p1879-83 Mar 15 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Iterative methods, Perturbation theory), (*Perturbation theory, Iterative methods), Quantum mechanics, Hydrogen, Ground state, Harmonic oscillators, Series.

The practicality of the first-order perturbation-iteration method (FOPIM) is appraised. After the first iteration, the expectation value of the energy is given by a nonanalytic function of the perturbation parametger L. The asymptotic expansion of this function gives the energy accurately up to O(L to the eighth power). The convergence of the asymptotic expansions is discussed. Two examples are considered: a perturbed ground-state hydrogen atom, and a perturbed ground-state linear harmonic oscillator. (Author)

AD-616 820 Div. 25/4, 25/5

Rochester Univ., N. Y. Dept. of Physics and Astronomy.
RELATION BETWEEN QUANTUM AND SEMICLASSICAL DESCRIPTION OF OPTICAL COHERENCE,
by C. L. Mehta and E. C. G. Sudarshan. 12 Oct 64, 8p
AROD 4965:3 Unclassified report
Pub. in The Physical Review v138 n1B pB274-80 Apr 12 1965.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Quantum mechanics, Optical phenomena), (*Optical phenomena, Quantum mechanics), Field theory, Lasers, Statistical functions, Boundary value problems, Correlation techniques.

The problem of relating the semiclassical and quantum treatments of statistical states of an optical field is re-examined. The case where the rule of association between functions and operators is that of antinormal ordering is studied in detail. It is shown that the distribution function for each mode corresponding to this case is a continuous bounded function, and is also a boundary value of an entire analytic function of two variables. The nature of the distribution for the normal ordering rule of association and its relation to this entire function are discussed. It is shown that this distribution can be regarded as the limit of a sequence of tempered distributions.

AD-616 822 Div. 25/2, 17/6

California Univ., Los Angeles.
THE EFFECT OF ELASTIC INTERACTION ON THE DURATION OF GUINIER-PRESTON ZONE GROWTH,
by W. B. Grupen and G. Sines. 9 Jun 64, 6p
Grant DA AROD31 124G505
AROD 3870:3

Unclassified report

Pub. in Acta Metallurgica v13 p527-31 May 1965 (Copies available only to DDC users).

Descriptors: (*Crystal growth, Aluminum alloys), (*Elasticity, Crystal growth), Crystal lattice defects, Crystal structure, Stresses, Solid solutions, Copper alloys, Silver alloys, Zinc alloys, Phase studies, Diffusion, Mathematical models.

The effect of the elastic interaction between Guinier-Preston zones of the first kind (GP 1) and vacancies on the retardation of the annealing-out of quenched-in vacancies is studied numerically. It is shown that this retardation gives an explanation of the longer duration of GP 1 zone growth in Al-Cu as compared to Al-Ag or Al-Zn. (Author)

AD-616 827 Div. 8/6, 15/2

Courant Inst. of Mathematical Sciences, New York. Univ., N. Y.
STOCHASTIC EQUATIONS AND WAVE PROPAGATION IN RANDOM MEDIA.
Research rept.,
by Joseph B. Keller. Sep 64, 29p
Rept. no. EMp-192
Contract AF19 604 3495, Proj. 5631, Task 563104
AFCRL 63-375

Unclassified report

Pub. in Proceedings of Symposia in Applied Mathematics, v26, Stochastic Processes in Mathematical Physics and Engineering p145-170 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stochastic processes, Propagation), (*Perturbation theory, Propagation), Wave transmission, Differential equations, Integral equations, Electromagnetic waves.

Stochastic equations with small random terms are considered. A perturbation method is applied to obtain an equation satisfied by the expected solution of such a stochastic equation. The method is then applied to wave propagation in random continuous media and to wave propagation in random media of discrete scatters. In both cases results are obtained for the effective propagation constant of the random medium. An alternative formulation of such problems in terms of hierarchy equations and another in terms of equations for generating functionals are given. Finally the transport theory of incoherent intensity is presented. (Author)

AD-616 828 Div. 25/2, 25/6

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
OSCILLATORY PHOTOCONDUCTIVITY OF CdS,
by Y. S. Park and D. W. Langer. 13 Jul 64, 5p ARL 65-57

Unclassified report

Pub. in Physical Review Letters v13 n13 p392-4 Sep 28 1964.
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Photoconductivity, Semiconductors), (*Cadmium compounds, Photoconductivity), (*Sulfides, Cadmium compounds), Oscillation, Single crystals, Atomic energy levels, Electron transitions, Photons, Energy, Cryogenics.

A discussion is presented of periodic oscillations of the photoconductivity in the impurity region made at 4 K on selected CdS single crystals.

AD-616 829 Div. 25/5, 25/6, 15/1

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
DERIVATION OF THE DIRAC VECTOR MODEL FOR A SOLID,
by William J. Mullin. 10 Jun 64, 5p
ARL 65-78

Unclassified report

Pub. in Physical Review v136 n4A pA1126-30 Nov 16 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Quantum mechanics, Solids), (*Solids, Mathematical models), Vector analysis, Series, Determinants, Spin, Hamiltonian, Integrals, Ferromagnetic materials, Antiferromagnetism.

A cluster expansion derivation of the Dirac vector model, which has important applications in the theory of ferromagnetic and antiferromagnetic materials, is given for the case of a solid with a wave function which is a linear combination of Slater determinants, each corresponding to a different spin configuration. It is assumed that the single-particle wave functions are nonorthogonal, with one particle per lattice site. It is shown that there is no 'nonorthogonality catastrophe' and that Carr's condition for the validity of the vector model applies in this case, as he has conjectured. Expressions are given for the direct energy and exchange integral. (Author)

AD-616 831 Div. 25/3

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
MAGNETIC FIELD OF NONCYLINDRICAL COILS,
by W. J. C. Grant and M. W. P. Strandberg.
2 Dec 63, 4p

Unclassified report

Pub. in Review of Scientific Instruments v36 n3 p343-6 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Coils, Magnetic fields), (*Magnetic fields, Coils), (*Rectangular bodies, Coils), Theory, Errors.

An exact calculation is presented for the magnetic field produced by a pair of rectangular coils. The calculation is not based on approximations tailored for the central region of the configuration. For current sheets of rectangular cross section, a closed analytical expression is obtained for the fields which is exactly valid for all points on the principal coordinate planes, and for all possible combinations of coil parameters. The calculation is extended to sources of arbitrary thickness by numerical integration. Detailed numerical application is made to the calculation of field homogeneity in the central region of the configuration. (Author)

AD-616 833 Div. 25/6, 25/2

Illinois Univ., Urbana.
DISLOCATION DAMPING IN SEMICONDUCTORS AND ABRUPT VERSUS SMOOTH KINKS,
by T. Ninomiya, R. Thomson, and R. Garcia-Moliner.
18 Jun 64, 6p
Grant AF AFOSR179 62, Proj. 9761, Task 976101
AFOSR 65-0797
Unclassified report

Pub. in Journal of Applied Physics v35 n12 p3607-13 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Semiconductors, Crystal lattice defects), (*Damping, Crystal lattice defects), (*Crystal lattice defects, Semiconductors), Internal friction, Impurities, Mathematical models, Silicon, Germanium.

A previous dragging point model of dislocation mobility is modified and applied to the dislocation damping data in Si and Ge. The motion of built-in kinks along a dislocation is considered to be responsible for the damping. In contrast to the abrupt kink model, the free motion of the kinks is impeded by the dragging points. The predictions of this model are compared with those made on the basis of the abrupt kink model, with regard to (a) damping, (b) estimated kink width, and (c) dislocation mobility. The dragging-point model seems to give a more consistent picture, although direct experimental verification of the presence of dragging points is not yet available. An improved table of derived parameters for the dragging-point theory of dislocation mobility is given based on additional information from damping measurements in Ge. (Author)

AD-616 837 Div. 25/3, 25/2

Air Force Avionics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
EFFECTS OF A GUARDRING UPON LOW-ENERGY SPUTTERING YIELDS OF FLAT, SINGLE-CRYSTAL GOLD TARGETS,
by W. C. Kreye. 13 Mar 63, 8p AL TR-64-298
Proj. 4152
Unclassified report

Pub. in Journal of Applied Physics v34 n9 p2897-902 Sep 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sputtering, Gold), (*Plasma sheath, Sputtering), Rings, Copper, Plasma physics, Argon, Low-pressure research, Single crystals, Symmetry-(Crystallography).

Spectrometric sputtering yield measurements were performed upon flat, single-crystal gold targets in a supported argon plasma, and the results are compared with those obtained when a large copper guardring was placed about the target. After the results are adjusted to similar discharge conditions, the relative yields without the guardring are greater for all three orientations, (100), (110), and (111). The increase is attributed to the formation of a curvature to the Langmuir layer immediately about the gold target when the guardring is not used. This introduces ions which strike the gold surface at oblique incidence angles. The square root of the relative yield is plotted against the target voltage, and the curves are found to be linear in the range of 40-70 V. The intercepts E of the extrapolated linear portions of the two curves, with and without a guardring, are found to be equal for each orientation. These values, at 9 microns of argon, are 33, 28.5, and 35 eV for the (100), (110), and (111) faces, respectively. These values do not include the subtractive correction for the plasma potential whose measured value is approximately 15 eV. For the (100) and (111) faces, the calculated differences (E - E (110)) are proportional to the corresponding differences in the binding energies of a surface atom which is in an upper, complete lattice plane. (Author)

AD-616 848 Div. 8/6
CFSTI Prices: HC$1.00 MF$0.50

Navy Electronics Lab., San Diego, Calif.
PHASE STABILITY MEASUREMENTS OF 18.6-KC RADIO TRANSMISSIONS.
Research rept.,
by J. A. Silkwood. 4 Jun 59, 16p Rept. no. NEL-899
Proj. SR06401, Tasks NE120000 839F7, NEL M2 1
Unclassified report

Descriptors: (*Radio transmission, Phase shift), (*Ionospheric propagation, Radio signals), Stability, Very low frequency, Diurnal variations, Measurement, Phase(Electronics).

Measurements were made of the arrival time of 18.6 kc signals over a north-to-south propagation path by means of phase comparison. The variability of the transmission time during both daytime and nighttime was measured, as well as the diurnal changes. The results were consistent with those reported by other investigators. The diurnal rate of change of transmission time appears to be related to the solar illumination of the total propagation path. (Author)

AD-616 855 Div. 25/3
CFSTI Prices: HC$1.00 MF$0.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
ION-NEUTRAL COLLISIONS IN AFTERGLOW,
by W. L. Fite, J. A. Rutherford, W. R. Snow, and V. A. J. van Lint. 23 Jan 62, 21p Rept. no. GA-2824
Contract DA49 146XZ049
Unclassified report

Descriptors: (*Gas discharges, Plasma physics), (*Plasma physics, Gas discharges), Gases, Mixtures, Excitation, Radiofrequency pulses, Chemical reactions, Ions, Luminescence, Mass spectroscopy, Gas ionization.

In order to study collisions between ions and neutral particles at thermal energies, a series of experiments have been carried out which utilize high-speed mass-spectrometric monitoring of the afterglows in gases

produced by (1) radio-frequency discharges and (2) 20-Mev electron pulses. Ion-clustering, charge-transfer, and ion-exchange processes have been observed in atmospheric gas mixtures. From the ion histories in the afterglows, approximate values of the pertinent reaction rates are deduced. (Author)

AD-616 856 Div. 25/6, 8/2

Air Force Cambridge Research Labs., Bedford, Mass.
ON THE STUDY OF FINE STRUCTURE IN TUNNEL JUNCTIONS.
Physical Sciences Research papers,
by F. D. Shepherd, Jr., A. C. Yang, V. E. Vickers, and T. R. King, Jr. 5 Oct 64, 6p Rept. no. PSRP-96, AFCRL 65-277
Proj. 5621, Task 562103
Unclassified report

Pub. in Institute of Electrical and Electronics Engineers. Proceedings v53 n2 p175 Feb 1965. (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with Northeastern Univ., Boston, Mass. Dept. of Electrical Engineering.

Descriptors: (*Tunneling(Electronics), Phonons), Semiconductors, Electric currents, Diodes(Semiconductor).

A new method of determining fine structure in tunnel currents is described. The method is capable of resolution of phonon and other threshold phenomena in diodes where previous methods have had little success. In particular, the function R(V) = d/dV(ln(I/V)) is calculated as a method of resolving fine structure. Experimental results are given. (Author)

AD-616 857 Div. 8/6, 2/6

Air Force Cambridge Research Labs., Bedford, Mass.
INVESTIGATION OF GEOMAGNETIC DUCT PROPAGATION OF HIGH-FREQUENCY RADIO SIGNALS.
Environmental research papers,
by G. J. Gassmann, T. B. Barrett, and B. Pratt.
25 Sep 64, 18p Rept. no. ERP-98, AFCRL 65-275
Proj. 5631, Task 563114
Unclassified report

Pub. in Journal of Geophysical Research v70 n3 p613-24 Feb 1 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with American Science and Engineering, Cambridge, Mass. and Dartmouth Coll., New Hampshire.

Descriptors: (*Radio signals, Propagation), (*Terrestrial magnetism, Radio signals), Doppler effect, Upper atmosphere, High frequency.

The propagation of HF radio waves along field-aligned ionization gradients along geomagnetic shells L=3.5 and L=1.6 was investigated with airborne equipment at the southern conjugate points. Both pulse travel time and Doppler shift techniques were employed to detect these magnetospheric signals and to differentiate them from signals propagated via the ionosphere. By means of the Doppler shift technique, a signal component was detected that had the frequency shift predicted for magnetospheric propagation. This signal was estimated to have a transmission loss considerably greater than that for ionospheric propagation. (Author)

AD-616 858 Div. 25/4, 25/3

Air Force Cambridge Research Labs., Bedford, Mass.
HELIUM CONTINUUM AFTERGLOW IN THE VACUUM ULTRAVIOLET.
Physical sciences research papers,
by R. E. Huffman, J. C. Larrabee, Y. Tanaka, and D. Chambers. 21 May 64, 7p
Rept. no. AFRCL 65-235, PSRP-91
Proj. 9627, Task 862701
Unclassified report

Pub. in Journal of the Optical Society v55 n1 p101-2 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ultraviolet radiation, Gas discharger), (*Helium, Gas discharges), Optics, Continuum mechanics, Spectra(Visible + ultraviolet), Diatomic molecules, Plasma physics, Gas ionization.

The Hopfield helium continuum occurring between approximately 600 and 1000 A has been found to be primarily emitted as an afterglow following the current pulse of a repetitive, condensed discharge. The continuum radiation emission begins about 0.14 micro sec after termination of the 0.3 micro sec current pulse and continues for approximately 16 micro sec. This confirmation of our earlier suggestion (J.Opt.Soc.Am. 52:851(1962)) is further evidence that this continuum originates from molecular helium. Typical results and comparison with previous time-resolved studies of the visible region He2 bands are given. (Author)

AD-616 864 Div. 25/2, 17/7

Alberta Univ., Edmonton.
COBALT WHISKERS,
by M. J. Bibby, A. G. McMullen, and J. Gordon Parr. 1963, 6p
Grant DRB9536 16
Unclassified report

Pub. in Cobalt n19 p1-5 Jun 1963 (Copies available only to DDC users).

Descriptors: (*Cobalt, Single crystals), (*Fiber metallurgy, Cobalt), Crystal growth, Crystal lattice defects, Transformations, Crystal structure, Metallic crystals.

An investigation was made of the morphological and transformation characteristics of cobalt whiskers.

AD-616 887 Div. 25/1
CFSTI Prices: HC$3.00 MF$0.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
ARCHITECTURAL ACOUSTICS: SIMPLIFIED MEASURING TECHNIQUES.
Technical rept. for Oct 64-Jan 65,
by M. L. Look. May 65, 60p Rept. no. R-373
Proj. Y-F015 99 01 400
Unclassified report

Descriptors: (*Acoustics, Buildings), Sound transmission, Acoustic insulation, Absorption, Measurement, Acoustic equipment, Noise analyzers, Oscilloscopes, Experimental data, Graphics.

A preliminary study of the state of the art in architectural acoustics revealed a definite need for an improvement of methods for in situ acoustical measurements. A study was therefore made to develop and demonstrate measuring techniques and equipment that are simple, portable, and reasonably accurate. Techniques for measuring three fundamental acoustical parameters are presented, and extensive background material is provided to familiarize the reader with the principles and terminology of architectural acoustics. Methods, utilizing a memory oscilloscope, were developed for measuring the transmission loss of walls and partitions

and for measuring the reverberation time of large rooms. A standard method for obtaining sound-absorption coefficients and measuring a wall material's specific impedance is presented, showing the expedience of the Smith Chart for making impedance calculations. Experimental measurements were made to evaluate and demonstrate the methods, and the results are in the form of tables, graphs, and oscilloscope traces. All three methods fulfill the task objectives. Elaborate setups are not required, and transmission losses can be determined at a fraction of the cost of measurements by present standard techniques. (Author)

AD-616 892 Div. 25/8
CFSTI Prices: HC$2.00 MF$0.75

Naval Research Lab., Washington, D. C.
AN EXPLORATORY STUDY OF RADIANT ENERGY TRANSPORT IN BeO.
Final rept.,
by E. J. Chapin and D. G. Howe. 22 Mar 65, 73p
Rept. no. NRL-6195
Task 72404
Unclassified report

Descriptors: (*Beryllium compounds, Oxides), (*Heat transfer, Beryllium compounds), (*Thermal conductivity, Beryllium compounds), Vapor pressure, Emissivity, Phonons, Photons, High-temperature research, Low-pressure research.

Current hypotheses were reviewed relative to the contribution of radiant energy to heat transfer in BeO. The problem of radiant energy transmission in BeO was explored by exposing simultaneously, two types of BeO sample materials heated from 1000 to 2000 C, to pulses of radiant energy of known intensity. The effects were monitored with potentiometer and oscilloscope instruments from emf signals obtained from thermocouple detectors. Translucent thin-walled BeO tube material, heated from 1000 to 2000 C, exhibited no sustained transmission of radiant energy when exposed to radiant energy pulses of high intensity. An initial effect from the applied incident radiant energy was detected, however, which was interpreted to be due to the exposed surface of the BeO reaching a high temperature so rapidly that, momentarily, little heat was generated in the mass of the material and no immediate temperature rise occurred in the heated BeO. It was postulated that during this short interval incident radiant energy was transferred in the BeO by a process involving simultaneous emission and absorption of radiant energy in depth. As soon as the BeO temperature began to rise, this process of radiant energy transfer appeared to be replaced by the normal process of radiant energy absorption, conversion to heat, and reradiation. BeO heated above 1800C exhibited no tendency toward an initial rapid transfer of radiant energy. The lack of initial temperature effects from incident radiant energy was attributed to insufficient intensity. The overall results indicated that hot BeO did not become progressively diathermanous as its temperature increased but displayed a stronger opaque behavior toward radiant energy. (Author)

AD-616 894 Div. 25/3, 25/4, 25/6, 25/7, 30/1
CFSTI Prices: HC$3.00 MF$0.75

Naval Ordnance Lab., Corona, Calif.
FOUNDATIONAL RESEARCH PROJECTS.
Quarterly rept. for Jan-Mar 65.
1 Jun 65, 79p
Task R360FR104 211 1R011 01 01
NAVWEPS 8812
Unclassified report

Descriptors: (*Ferromagnetism, Naval research), (*Infrared spectroscopy, Naval research), (*Lasers, Naval research), (*Semiconductors, Naval research), (*Dipole antennas, Naval research), Programming-(Computers), Solid state physics, Atomic energy levels, Computer logic, Magneto-optic effect, Chlorine, Bromine, Argon, Praseodymium.

Contents: Coder components program, Ferromagnetic research, Infrared atomic spectra, Laser program, Semiconductor physics, Small antenna study, Solid state spectroscopy.

AD-616 903 Div. 20/1, 25/3
CFSTI Prices: HC$2.00 MF$0.50

Stanford Research Inst., Menlo Park, Calif.
RESEARCH ON COLLISION PROCESSES OF ELECTRONS AND ATOMS.
Annual rept. for 31 Aug 59-30 Sep 60,
by James R. Peterson. 7 Dec 60, 33p
Contract Nonr258800, Proj. SU2557
Unclassified report

Descriptors: (*Electron bombardment, Atoms), (*Ionization, Electron bombardment), Nitrogen, Oxygen, Ion accelerators, Electron guns, Crossed field devices.

A summary is given of the method being used to measure the cross section for ionization of nitrogen and oxygen atoms by electrons. The reaction e(-) + N to N(+) + 2e(-) has been observed, however, actual measurements were postponed pending further refinement of the apparatus. The development of the apparatus during the past year is described, including an improved low-noise, highly sensitive current-measuring system. A sensitive instrument for monitoring neutral beam currents of known energy by measuring the associated thermal power is described and analyzed. The instrument has a sensitivity of 50 microvolts per milliwatt. Several gases have been tested for their ability to produce neutral beams from N2(+) and N(+) beams via the charge-transfer process. Results of these tests are presented. (Author)

AD-616 904 Div. 20/1, 25/3
CFSTI Prices: HC$3.00 MF$0.75

Stanford Research Inst., Menlo Park, Calif.
RESEARCH ON COLLISION PROCESSES OF ELECTRONS AND ATOMS.
Final rept.,
by James R. Peterson and Charles J. Cook.
31 Jan 62, 56p
Contract Nonr258800, Proj. SU2557; ARPA Order 5 58
Unclassified report

Descriptors: (*Electron bombardment, Atoms), (*Ionization, Electron bombardment), Ion beams, Electron beams, Nitrogen, Argon, Molecular beams, Ion accelerators, Electron guns.

A description is given of the apparatus and method used in the measurement of cross sections for the ionization of atoms and molecules by electron impact. A cross-beam technique is employed, using a beam of fast atoms of 2 to 3 kev kinetic energy as a target. Product ions are analyzed according to their charge/momentum. Sources of spurious ion currents and other interference are discussed. Absolute cross sections were measured for incident electron energies ranging from below threshold to 500 ev; results are presented and discussed for the ionization of nitrogen and argon atoms, and for nitrogen molecules. The cross

section for e + N to N+ + 2e has an energy dependence rather similar to the theory of Seaton, but is about 20% smaller. The dissociative ionization cross section for N2 does not appear to be a direct process (i.e., occurring in less than 0.0000001 sec) for electron impact energies below 50 ev. (Author)

AD-616 909 Div. 8/6, 8/1, 15/1
CFSTI Prices: HC$2.00 MF$0.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
RADIATION AND GUIDING IN THE PRESENCE OF A UNIDIRECTIONALLY CONDUCTING SCREEN.
Research rept.,
by L. B. Felsen and A. Hessel. 16 Mar 65, 50p
Rept. no. PIBMRI-1247-64
Contract AF19 628 2357, Proj. 5635, Task 563501
AFCRL 65-221

Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Conductivity, Surfaces), (*Waveguides, Surfaces), Boundary value problems, Wave transmission, Electric currents, Fourier analysis, Coupling circuits.

A modal method is employed to construct the solution for the fields radiated by a linearly phased electric line current and by an electric current element oriented arbitrarily in a plane parallel to an infinite, unidirectionally conducting screen. In addition to the radiation field which is calculated, these sources generate surface waves with drastically different behavior for the two types of excitation. This aspect, related to the anisotropy of the surface, is explored and is clarified by the consideration of a source of finite extent which reveals both the quasi-line source and quasi-point source characteristics. The pecularities of surface waves on this anisotropic structure are given detailed consideration and are explained in simple physical terms. The present analysis contains results more general than those published recently in the literature, and it exhibits the connection between certain alternative but quite dissimilar forms of the solution. (Author)

AD-616 918 Div. 20/9, 20/5
CFSTI Prices: HC$2.00 MF$0.50

Naval Research Lab., Washington, D. C.
CALCULATIONS ON UNIFORM-FIELD BENDING MAGNETS.
Cyclotron rept.,
by P. Shapiro, S. Podgor, and R. B. Theus.
17 May 65, 35p Rept. nos. CR-1, NRL-6248
Proj. RR002 06 41 5008

Unclassified report

Descriptors: (*Magnets, Particle accelerators), (*Particle beams, Focusing), Ion beams, Deflection, Magnetic fields, Numerical analysis.

The focal properties of some uniform-field bending magnets have been calculated. This report gives tables and graphs of the image distance and magnification for deflection angles of 20, 22-1/2, 35, 40, and 45 degrees, as a function of the object distance and the angle the particle beam makes with the entrance and exit faces of the magnet. These numerical results are useful when designing ion-optical systems for particle accelerators. (Author)

AD-616 923 Div. 20/9, 20/5
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
TECHNIQUE FOR PULSING THE ELECTRON BEAM OF A VAN DE GRAAFF PARTICLE ACCELERATOR.
Technical rept.,
by Gerald Healey. Mar 65, 14p
Rept. no. ECOM-2564
Proj. 1C014501B11A, Tasks 1C014501B11A00, 1C014501B11A00 26

Unclassified report

Descriptors: (*Van de Graaff generators, Electron beams), (*Particle accelerators, Electron beams), Light pulses, Gamma rays, Pentodes, Phototubes.

The need for a pulsed high energy gamma source as a research tool, with the capability of changing the pulse profile, is filled by slightly modifying a Van de Graaff accelerator set up to run in a gnegative mode. The modification consists of triggering by means of an external pulsed light source. The light pulse is sensed and followed by a photo cell located in the control pentode on the high voltage terminal. (Author)

AD-616 941 Div. 25/3, 25/2

Army Electronics Labs., Fort Monmouth, N. J.
PARALLEL PUMPING IN NARROW LINEWIDTH PLANAR Mn-ZnY,
by Samuel Dixon, Jr., Arthur Tauber, and Robert O. Savage, Jr. 1965, 2p

Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1018-9 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Pumping(Electronics), Metallic crystals), (*Magnetic properties, Metallic crystals), Microwave frequency, Magnetic fields, Magnetic resonance, Maganese, Single crystals, Ferrites, Ferromagnetism.

Parallel pump measurements were made on Mn-substituted single-crystal ZnY at room temperature and 17.2 kMc/sec. The experimentally determined values of 1500 Oe for H sub c and 1700 Oc for H sub d were found to be in good agreement with theoretical predictions. The threshold rf field at H sub c is 0.65 Oe. This threshold field for spin-wave instability gives a spin-wave linewidth of 1.24 Oe. The susceptibility curve rises sharply at H sub d, peaks in the vicinity of H sub c and then falls off slowly at lower values of dc field. The ferrimagnetic resonance linewidth and dc magnetization were studied as a function of increasing Mn substituent at room temperature. The resonance linewidth decreases with increasing Mn substitution. A minimum of 3.8 Oe at 9.0 kMc/sec is observed in crystals with approximately 4 to 5 wt % Mn. The magnetization decreases linearly with increasing Mn substituent. (Author)

AD-616 942 Div. 25/3, 25/2

Army Electronics Labs., Fort Monmouth, N. J.
REDUCTION OF FERRIMAGNETIC RESONANCE LINEWIDTH AND CRITICAL FIELD IN SINGLE-CRYSTAL ZnY BY Mn SUBSTITUTION,
by Robert O. Savage, Jr., Samuel Dixon, Jr., and Arthur Tauber. 19 Aug 64, 1p

Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt1 p873-4 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetic resonance, Ferromagnetism), (*Metallic crystals, Magnetic resonance), Single crystals, Ferrites, Manganese.

AD-616 956 Div. 25/7, 25/4

National Research Council of Canada, Ottawa (Ontario). Div. of Radio and Electrical Engineering.
OPTICAL PROPERTIES OF THE HYDROSULFIDE ION IN KCl AND KBr CRYSTALS,
by J. Rolfe. 8 Jan 65, 2p Rept. no. NRC-8378
Unclassified report

Pub. in Applied Physics Letters v6 n4 p66-7 Feb 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrogen compounds, Sulfides), (*Optical properties, Sulfides), (*Ions, Single crystals), (*Band spectrum, Sulfides), Molecular spectroscopy, Infrared spectroscopy, Ultraviolet spectroscopy, Impurities, Potassium compounds, Chlorides, Bromides.

AD-616 962 Div. 25/1

Naval Research Establishment, Dartmouth (Nova Scotia).
EFFECT OF ICE COVER ON SHALLOW-WATER AMBIENT SEA NOISE,
by F. A. Payne. 30 Jun 64, 7p Rept. no. NRE-64/4
Proj. D108 38 01 07
Unclassified report

Pub. in Acoustical Society of America. Journal v36 n10 p1943-7 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Acoustics, Underwater sound), (*Underwater sound, Ice islands), (*Ice islands, Underwater sound), Extremely low frequency, Seas, Noise, Noise analyzers, Marine geophysics, Polar regions.

Shallow-water ambient-sea-noise measurements in the frequency range 20-3000 cps have been made in the Gulf of St. Lawrence off the north coast of Prince Edward Island, with and without ice cover. The presence of ice is found to make a large difference both to the level and to the spectral distribution of the ambient noise. Results are presented that illustrate both the effect of ice cover on the ambient noise and the transition from the 'open-water' to the 'ice-cover' condition. (Author)

AD-616 963 Div. 25/3

Cornell Univ., Ithaca, N. Y.
ALIGNED MAGNETIC FIELD PROBLEM.
Technical rept.,
by S. Leibovich and G. S. S. Ludford. Feb 65, 2p Rept. no. TR-7
Contract Nonr40106, Proj. NR061 125
Unclassified report

Pub. in AIAA Journal np 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetic fields, Configuration), Magnetohydrodynamics, Drag.

AD-616 968 Div. 20/2, 20/1, 20/3

National Bureau of Standards, Washington, D. C.
ELASTIC RESONANCES IN ELECTRON SCATTERING FROM He, Ne, Ar, Kr, Xe, AND Hg,
by C. E. Kuyatt, J. Arol Simpson, and S. R. Mielczarek. 16 Nov 64, 15p
Unclassified report

Pub. in The Physical Review v138 n2A pA385-99 Apr 19 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Elastic scattering, Electrons), (*Resonance, Elastic scattering), (*Helium group gases, Ionization), Mercury, Potential scattering, Resonance scattering, Helium, Neon, Argon, Krypton, Zenon.

The transmission of electrons through the rare gases and mercury vapor has been examined as a function of electron energy, with energy resolution of about 0.04 eV. Many anomalies (resonances) localized in energy have been observed, totaling 11 in helium, six in neon, two each in argon and krypton, five in xenon, and 13 in mercury. The interpretation of these resonances in terms of compound negative ion formation is discussed, and in several cases electron configurations are assigned to the negative ions. In helium, neon, xenon, and mercury, sharp decreases in transmission are observed which are attributed to the onset of inelastic processes. Definite identification of the inelastic processes in the case of helium permits calibration of the absolute electron energy scale to within ±0.03 eV. (Author)

AD-616 990 Div. 25/3, 30/5
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Berkeley.
THE STREAMER SPARK IN ASYMMETRICAL FIELD GAPS.
Technical rept.,
by Leonard B. Loeb. 1965, 50p Rept. no. TR-98
Contract N7onr29511, Proj. NR012 201
Unclassified report

Descriptors: (*Electrical corona, Sparks), Configuration, Attenuation, Photographic analysis, Glow discharges, Electric discharges.

Secondary streamers are shown to be real entities which start as the primary advances well into the gap, and are the result of an ionizing space wave launched from the anode region through action of the high anode potential on the inflowing electrons from the primary streamer. Branching is shown to be controlled by photoionization from the streamer tip. Lichtenberg figure tracks are smoothed by a long, slow potential decline in which continued current flow obliterates discontinuities. The light flashes observed when streamers strike the cathode are discussed. The zero field streamer theory is analyzed. Return strokes are proven to be fairly certain.

AD-616 994 Div. 25/2, 4/3
CFSTI Prices: HC$6.00 MF$1.25

Chicago Univ., Ill.
ORGANIC CRYSTAL SYMPOSIUM, 1965 May 10, 11, 12. 1965, 222p
AROD 5109:1
Unclassified report

Descriptors: (*Organic compounds, Crystals), (*Symposia, Organic compounds), (*Crystallography, Organic compounds), Crystal structure, Impurities, Spectroscopy, Fluorescence, Aromatic compounds, Polycyclic compounds, Excitation, Crystal lattice defects, Electroluminescence, Phthalocyanines, Copper compounds, Hall effect.

AD-616 996 Div. 25/1
CFSTI Prices: HC$4.00 MF$1.00

Naval Research Lab., Washington, D. C.
SYSTEMATIC ERRORS IN ULTRASONIC PROPAGATION

PARAMETER MEASUREMENTS. PART 2. EFFECTS OF GUIDED CYLINDRICAL MODES.
Interim rept.,
by V. A. Del Grosso. 29 Jan 65, 132p
Rept. no. NRL-6133
Proj. RF001 03 45 5251
Unclassified report

Descriptors: (*Sound, Propagation), (*Ultrasonic radiation, Cylindrical bodies), (*Cylindrical bodies, Sound transmission), Acoustics, Liquids, Errors, Graphics, Velocity, Boundary value problems, Absorption, Diffraction, Corrections, Transducers.

It was shown in Part 1 (AD-437 995) of this series of reports that appreciable errors in sound speed and sound absorption determinations may be attributed to a neglect in applying appropriate corrections to those situations closely approximating free-field conditions (finite size, plane-parallel source). In the present report it is shown that appreciable errors in the measurement of sound speed and sound absorption for guided mode propagation may be attributed to neglect in applying corrections that may be required because of the selection of geometric parameters or the method of measurement. This report contains graphs of pressure and phase, relative to plane-wave values and averaged over a plane-parallel receiver of size equal to the source size, for acoustic energy propagation down a right-circular liquid cylinder with lateral boundary condition appropriate to one of the following: absolutely rigid walls, infinitely flexible walls, liquid walls, or elastic solid walls. The latter boundary condition, which is considered to be that more appropriate to the situation of a liquid contained within a thick-walled metal tube, is shown to result in maximum anomalies in sound speed determinations when the transducer completely closes one end of the tube. (Author)

AD-616 999 Div. 25/6
CFSTI Prices: HC$2.00 MF$0.50

Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
THE POSTBUCKLING EQUILIBRIUM OF AXIALLY COMPRESSED CIRCULAR CYLINDRICAL SHELLS,
by Nicholas J. Hoff, Wayne A. Madsen, and J. Mayers.
feb 65, 37p Rept. no. SUDAER-221
Contract AF49 638 1276
AFOSR 65-0643
Unclassified report

Descriptors: (*Structural shells, Cylindrical bodies), (*Deformation, Structural shells), Buckling(Mechanics), Numerical analysis, Strain(Mechanics).

Earlier numerical solutions of the von Karman-Donnell large-displacement equations for thin circular cylindrical shells have been extended by considering larger numbers of terms in the double Fourier series representing the radial displacements after buckling. In the most comprehensive one of the calculations whose results are presented here a total potential energy expression consisting of about 1100 terms was minimized with respect to 16 unknowns. The results of the computations as well as theoretical considerations indicate that the solution for long shells of the von Karman-Donnell equations with the aid of the von Karman-Tsien Leggett procedure leads in the limit to the trivial solution in which the amplitude of the displacements tends to zero, the number of waves around the circumference tends to infinity and the average axial compressive stress capable of maintaining equilibrium in the post-buckling state tends to zero. (Author)

AD-617 014 Div. 25/1, 9/1

Minnesota Univ., Minneapolis.
SURFACE AND VOLUME SOUND FROM BOUNDARY LAYERS,
by William C. Meecham. 11 Jun 64, 6p
Unclassified report

Pub. in The Journal of the Acoustical Society of America v37 n3 p516-22 Mar 1965
(Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Turbulent boundary layer, Sound), (*Sound, Turbulent boundary layer), (*Acoustics, Turbulent boundary layer), Fluid flow, Cylindrical bodies, Boundary layer, Noise.

It is made plausible for turbulent boundary layers that surface, dipole sound is in general very much less than volume, quadrupole sound. This is so for two reasons. Firstly, the relative volume sound is increased by several orders of magnitude because of shear-flow enhancement within the boundary layer. Secondly, through the use of an image argument similar to that used in the discussion of flat layers, it is indicated that the dipole sound is reduced by a factor of sq (L/R), where L is the boundary layer thickness and R is the surface radius of curvature. A discussion of irregular, surface bumps shows that such imperfections may be the source of significantly large dipole sound. A calculation is given of low-Mach-number surface and volume sound from a rotating cylinder. (Author)

AD-617 015 Div. 20/2, 15/1

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
MINIMUM PRINCIPLE FOR MULTI-CHANNEL SCATTERING,
by Leonard Rosenberg and Larry Spruch. 4 Oct 61,
9p Rept. no. CX-56
Contracts AF19 604 4555, DA30 069ORD2581
Unclassified report

Pub. in Physical Review v125 n4 p1407-14 Feb 15 1962
(Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear scattering, Calculus of variations), (*Calculus of variations, Nuclear scattering), Potential theory, Matrix algebra, Neutrons, Protons.

The usual variational principles of scattering theory are simply stationary principles. In a recent series of papers, all restricted to single-channel scattering, conditions were established under which variational principles can be found which are much more powerful in that the functional that represents the variational estimate is not simply stationary in the neighborhood of the exact scattering solution but is rather an extremum. A lower bound was obtained on the single real parameter, tanN, which characterizes the scattering in the (uncoupled) channel c. The conditions previously established allowed for composite bound states, for the Pauli principle, for arbitrary angular momenta, and for long-range and in particular Coulomb potentials; at nonzero energies, the various potentials had to be truncated. The present paper deals with the extension to multi-channel scattering in which each of the open channels contains only two systems. The bounds are now on linear combinations of the elements of the reactance matrix or of the derivative matrix. The potentials must be truncated in a fashion very similar to that used in Wigner-Eisenbud theory. (Author)

AD-617 016 Div. 20/2

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
LOW-ENERGY SCATTERING OF A CHARGED PARTICLE BY A NEUTRAL POLARIZABLE SYSTEM,
by Thomas F. O'Malley, Leonard Rosenberg, and Larry Spruch. 12 Oct 61, 12p Rept. no. CX-57
Contracts AF19 604 4555, DA30 069ORD2581
Unclassified report

Pub. in Physical Review v125 n4 p1300-10 Feb 15 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Charged particles, Nuclear scattering), (*Nuclear scattering, Charged particles), Polarization, Nuclear electric moments, Dipole moments, Potential theory, Power series, Electrons, Positrons, Neutron scattering.

In the scattering of a particle (or system) of charge Ze by a neutral system with an electrical polarizability a, an electric dipole moment is induced which generates an effective potential that behaves asymptotically as -a(Ze)sq/2r to the 4th power. Due to this effective long-range interaction, effective-range theory in its normal form is not applicable. Thus, for the scattering of a particle with an incident orbital angular momentum of zero, for example, the expansion of k cotN(0) includes terms in k and in k sq lnk, in addition to the usual constant and k sq terms. The effective range as normally defined is infinite, but one can define a quantity which explicitly takes into account the long-range character of the effective potential. For L>0 it is k sq cotN(L) which approaches a constant as k approaches zero rather than k to the (2L + 1) power cotN(L) as for a short-range potential. The above results can have serious consequences in the scattering of electrons and of positrons by neutral spherically symmetric atoms. Some detailed consideration is given to the scattering by hydrogen atoms. The formulation of effective-range theory which is given is valid when Pauli exchange between the two colliding systems is possible. The method used for taking into account the effect of the Pauli principle (this method would be the same for long-range and short-range forces) is rather more convenient than in the usual presentation of effective range theory. (Author)

AD-617 021 Div. 25/2

Brookhaven National Lab., Upton, N. Y.
CYCLOIDAL SPIN CONFIGURATION OF ORTHORHOMBIC MnSO4,
by G. Will, B. C. Frazer, G. Shirane, D. E. Cox, and P. J. Brown. 1965, 1p
Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p1095 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Crystal structure, Manganese compounds), (*Manganese compounds, Sulfates), X-ray diffraction analysis, Neutron diffraction analysis, Magnetic properties, Symmetry(Crystallography), Transition temperature.

The crystal and magnetic structures of antiferromagnetic MnSO4 (a = 5.260 A, b = 8.042 A, c = 6.847 A, space group Cmcm) have been determined from x-ray and neutron diffraction data collected from polycrystalline samples at 300 and at 77 and 4.2K, respectively. The neutron diffraction pattern at 4K exhibits additional peaks of magnetic origin which are slightly displaced from the positions expected on the basis of the original unit cell, or any simple multiple cell. In addition, the observed extinction rules cannot be satisfied by any combination of simple collinear magnetic structures. Complete indexing of the magnetic peaks can be achieved only on the basis of a cone spiral arrangement related to a simple antiferromagnetic structure of CrVO4 type, in which ferromagnetic (001) sheets are coupled antiparallel to adjacent sheets. The propagation vector of the spiral is along the a axis with a periodicity of 30 A (almost 6a). The spin plane of the spiral component is the a-b plane. It is believed that this is the first case in which a spiral has been observed in an orthorhombic compound, and it is of particular interest that the spiral is cycloidal. Good agreement of observed and calculated magnetic intensities is obtained with a fundamental spin component of 1.7 mu sub B directed along the c axis, and a spiral component of 4.5 mu sub B in the a-b plane. The resultant moment of each Mn(2+) ion is therefore 4.8 mu sub B, and the cone half-angle is about 78 deg. The temperature dependence of the satellite peaks indicates a Neel point of about 10K. (Author)

AD-617 023 Div. 25/3

Minnesota Univ., Minneapolis. School of Physics.
SOME PROPERTIES OF THE TWO-STREAM INSTABILITY AT LARGE AMPLITUDES,
by Paul J. Kellogg. 24 Jun 64, 9p
Grant NSG281 62
Unclassified report

Pub. in Physics of Fluids v8 n1 p102-10 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasma medium, Distortion), (*Friction, Plasma medium), Electron beams, Ion beams, Heating, Electric fields, Partial differential equations.

The behavior of the electric two-stream instability for electrons streaming through ions is investigated by treating the relevant Vlasov equations as partial differential equations and integrating them on a computer. As was shown by Buneman, the growth of the instability provides a friction between the electrons and ions. It is shown that the friction is proportional to the mean square electric field, approximately, and the coefficient is derived analytically and checked by the computer calculations. The friction converts the relative motion into heat, and the ratio between the heating of the electrons and the ions is shown to be of the order of the square root of the mass ratio. (Author)

AD-617 024 Div. 20/2

Royal Military Coll. of Canada, Kingston (Ontario).
RAPID ANNIHILATIONS OF POSITRONS IN POLYATOMIC GASES,
by D. A. L. Paul and L. Saint-Pierre. 23 Oct 63, 4p
Grant DRB9510 25 Unclassified report

Pub. in Physical Review Letters v11 n11 p493-6 Dec 1 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Annihilation reactions, Positrons), (*Positrons, Annihilation reactions), (*Polyatomic molecules, Annihilation reactions), Positronium, Gases, Argon, Methane, Butane, Carbon tetrachloride, Aliphatic compounds.

Experimental values are presented of the annihilation rates in gases of slow positrons which have failed to form positronium. The observed values for argon, methane, ethane, propane, n-butane, isobutane, and carbon tetrachloride are found to exceed the values derived from the Dirac theory by factors ranging from 3 to 700.

AD-617 029 Div. 8/6, 5/2, 6/6

Army Electronics Labs., Fort Monmouth, N. J.

ANOMALOUS DOPPLER RECEPTION OF BEYOND-THE-HORIZON PROPAGATION MODE,
by Haim Soicher. 3 Feb 65, 2p

Unclassified report

Pub. in Proceedings of the IEEE v53 n4 p405-6 Apr 1965. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Doppler effect, Over-the-horizon detection), (*Over-the-horizon detection, Doppler effect), (*Ionospheric propagation, Doppler effect), Satellites (Artificial), Radio transmission, Space communication systems, High frequency.

Some anomalous Doppler curves, describing satellite signal reflections from ionospheric ionization irregularities, and traversal of the transmitting satellite from a non-illuminated ionosphere into an illuminated one during ground reception, have been previously discussed in the literature. However, the anomalous Doppler curve of 1959 Iota I (20-M/s beacon frequency, inclination 50 degrees, apogee 1100 km, perigee 550 km), Orbit 8754, appears to be a typical example of hop propagation between the ground and an illuminated ionosphere. A figure is presented which shows a sudden 25-c/s frequency shift at about 170 seconds after intime of the satellite.

AD-617 033 Div. 20/2

Theoretical Chemistry Inst., Univ. of Wisconsin, Madison.
CALCULATED ELASTIC SCATTERING CROSS SECTIONS FOR THE Li(+)-He SYSTEM,
by G. G. Weber and R. B. Bernstein. 27 Oct 64, 6p
Contract AT11 1 1328; Grant NSG275 62

Unclassified report

Pub. in Journal of Chemical Physics v42 n6 p2166-71 Mar 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Elastic scattering, Differential cross section), (*Lithium, Elastic scattering), Ions, Potential theory, Helium, Quantum mechanics, Potential scattering.

Calculations of the energy dependence of the total (and differential) elastic scattering cross sections for the Li(+)-He system have been carried out for a number of assumed interaction potentials taken from the literature. All of these are known to yield fairly good fits to existing mobility data, sensitive primarily to the long-range term in the potential. The present results show that the total quantum cross sections (as well as the angular distributions) are also quite sensitive to the potential at short range (e.g., r<4 A), even at low collision energies (E<1 eV). In particular, the behavior of the extrema in the energy dependence of the total cross sections offers a means of discrimination among the potentials. (Author)

AD-617 036 Div. 25/5, 15/1

Theoretical Chemistry Inst., Univ. of Wisconsin, Madison.
EFFECT OF THREE TURNING POINTS ON SEMI-CLASSICAL SCATTERING,
by C. F. Curtiss. 27 Nov 64, 2p
Grant NsG275 62

Unclassified report

Pub. in Journal of Chemical Physics v42 n7 p2267-9 Apr 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Quantum mechanics, Potential theory), (*Potential theory, Quantum mechanics), Transport properties, Scattering, Phase shift.

When three turning points occur in the effective potential, the region between the two inner turning points is associated with classically bound trajectories or quantum-mechanically metastable states. The effect of this portion of the effective potential-energy curve on the semiclassical phase shifts and transport cross sections is discussed. (Author)

AD-617 038 Div. 20/2

Stanford Univ., Calif.
EFFECT OF CLOSED INELASTIC CHANNELS ON THE WIDTH OF RESONANCES,
by Gordon L. Shaw, Jose R. Fulco, and David Y. Wong. 16 Oct 64, 8p
Contract AF49 638 1389
AFOSR 65-0847

Unclassified report

Pub. in Physical Review v137 n5B pB1242-9 Mar 8 1965 (Copies not available to DDC or Clearinghouse customers).
Prepared in cooperation with California Univ., Santa Barbara, and California Univ., La Jolla.

Descriptors: (*Inelastic scattering, Nuclear resonance), (*Nuclear resonance, Inelastic scattering), Pions, Meson scattering, K-mesons, Baryons, Numerical methods + procedures.

AD-617 040 Div. 20/2

Stanford Univ., Calif.
UNCOUPLED-PHASE METHOD IN THE MULTICHANNEL N/D FORMALISM,
by Pran Nath and G. L. Shaw. 28 Sep 64, 6p
Contract AF49 638 1389; Grant NSF GP948
AFOSR 65-0845

Unclassified report

Pub. in Physical Review v137 n3B pB711-6 Feb 8 1965. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear scattering, Potential theory), Relativity theory, Field theory, Integral equations, Matrix algebra, S-matrix.

The uncoupled-phase method is a nonpeturbative formalism, developed by Ross and Shaw, relating the scattering amplitudes describing n strongly coupled two-body channels to the 'uncoupled' amplitudes describing n-1 channels alone. The 'uncoupled' scattering amplitudes are defined to be those that would exist if the couplings to the nth channel were switched off while the interactions among the n-1 channels remain unchanged. The uncoupled-phase method, previously based on the potential model, is extended to the relativistic problem by considering a set of n coupled N/D partial-wave dispersion relations. For the situation in which the left-hand cut is approximated by the form g/(s+m) where g is an nXn matrix of constants and s is square of the total energy in the center-of-mass system, the uncoupled-phase method is exact. The quantitative validity of the uncoupled-phase method for more complicated left-hand singularities is tested by performing a two-channel computer experiment. A full numerical solution of the coupled integral equations for the N functions is obtained by the matrix-inversion technique. We consider the situations in which (a) the left-hand cut is replaced by a set of dipoles and (b) the left-hand cut is assumed to be given by exchange of a scalar particle in the corresponding 'crossed' t channel of any given reaction. The coupled-phase method is found to be

quantiatively accurate under a wide range of conditions. The range parameter of the coupled-phase method is directly given by a principal-value integral, and an estimate of it can be made a priori. (Author)

AD-617 041 Div. 20/2

Institute of Theoretical Physics, Stanford Univ., Calif.
MUON(-)+He3 TO H3+NEUTRINO CAPTURE RATE,
by R. J. Oakes. 14 Aug 64, 3p
Contract AF49 638 1389
AFOSR 65-0844

Unclassified report

Pub. in Physical Review v136 n6B pB1848-50 Dec 21 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Meson capture, Muons), Neutrinos, Helium, Hydrogen, Inelastic scattering.

The muon capture rate in He3 for the process muon(-)+ He3 to H3+neutrino has been computed using nuclear wave functions suggested by recent analyses of e-He3 and e-H3 scattering experiments. (Author)

AD-617 042 Div. 20/2, 15/1

Institute of Theoretical Physics, Stanford Univ., Calif.
THRESHOLD AND ASYMPTOTIC BEHAVIOR OF THE N/D EQUATIONS,
by Myron Bander and Gordon L. Shaw. 7 Jul 64, 9p
Contract AF49 638 1389, Proj. 9751, Task 975001
AFOSR 65-0846

Unclassified report

Pub. in Annals of Physics v31 n3 pt2 p506-24 Feb 1965. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear scattering, Integral equations), (*Integral equations, Nuclear scattering), Quantum mechanics, Functional analysis, S-matrix, Phase shift.

Two important problems involved in obtaining solutions of partial wave dispersion relations (by the N/D method) are having (i) the correct threshold behavior, and (ii) an acceptable high energy behavior. Various physical and numerical approximations have been made to insure (i) and (ii). We numerically investigate the sensitivity of the solutions of the N/D equations to these approximations. For this purpose, we consider J = 1 pion-pion scattering, employing elastic unitarity and assuming that the left hand cut is dominated by the exchange of the rho resonance. Two significant features found are: (a) The values of the cutoffs needed to produce a resonance are quite sensitive to the input 'strength' of the left hand cut, e.g., a change of the input width of the rho by a factor of two changed the value for a 'straight cutoff' to produce a resonance at a given energy by a factor of ten. Due to the results of (a) we wish to emphasize the possible danger in employing a single cutoff in the calculations of SU3 multiplets. (b) If one introduces a pole on the left hand cut in order to insure the threshold behavior (i), then the ranges in values for the cutoffs (to insure (ii)) for which any resonance occurs are extremely narrow. On the other hand, a solution in which the phase shift does not become large is insensitive to the position of this pole. (Author)

AD-617 043 Div. 20/2

Institute of Theoretical Physics, Stanford Univ., Calif.
DECAY OF K MESON TO 2 PION AND SPONTANEOUS BREAKDOWN OF THE CP SYMMETRY,
by G. Marx. 28 Jan 65, 3p
Contract AF49 638 1389
AFOSR 65-0848

Unclassified report

Pub. in Physical Review Letters v14 n9 p334-6 Mar 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Meson reactions, Nuclear models), K-mesons, Pions, Field theory, Hamiltonian.

AD-617 044 Div. 20/2

Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
BINDING ENERGY OF LAMBDA HYPERONS IN HEAVY HYPERNUCLEI (60<A<100),
by D. H. Davis, R. Levi Setti, M. Raymund, J. Lemonne, and P. Renard. 5 Nov 62, 3p
Contract AF49 638 209, Proj. 9751, Task 975101
AFOSR 65-0837

Unclassified report

Research one in cooperation with Universite Libre de Bruxelles, Belgium.
Pub. in Physical Review Letters v9 n11 p464-6 Dec 1 1962. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nuclear binding energy, Hyperons), (*Hyperons, Nuclear binding energy), Nuclei, Charged particles, Meson reactions.

AD-617 045 Div. 25/2, 17/2

Westinghouse Research Labs., Pittsburgh, Pa.
DENDRITES,
by W. A. Tiller. 1964, 10p
Contract AF49 638 1029, Proj. 9761, Task 976102
AFOSR 65-0771

Unclassified report

Pub. in Science v146 n3646 p871-9 Nov 13 1964. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Phase studies, Crystal growth), (*Crystal growth, Phase studies), Transition temperature, Crystallography, Metallography, Crystal structure, Surface properties, Solutions, Crystallization.

The physics involved in the generation of crystal forms and dendritic forms is discussed. This generation is considered for both isothermal, or unconstrained, crystal growth, where crystals grow freely in a large bath of liquid of constant temperature which is below the melting temperature of the crystal; and crystal pulling, or constrained crystal growth, where crystals grow from a bath of liquid held at a temperature above the melting temperature of the crystal. Technological applications are also discussed.

AD-617 046 Div. 25/3

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
PLASMA ROTATION IN A HOLLOW-CATHODE DISCHARGE,
by David L. Morse. 15 Jun 64, 6p

Contract DA36 039AMC03200E; Grant NSF G24073
Unclassified report

Pub. in Physics of Fluids v8 n3 p517-21 Mar 1965. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasma medium, Rotation), Cathodes, Perturbation theory, Magnetic fields, Electric fields, Transport properties, Fluid dynamic properties, Distribution, Density, Hall effect, Theory.

Langmuir probe measurements of the external plasma generated by a hollow-cathode discharge indicate the presence of a 'flutelike' density perturbation, or 'vane' of plasma, rotating with a left-handed sense about the magnetic field. The velocity of rotation is found to be closely related to the Hall drift speed of particles in the measured outward radial electric and axial magnetic fields. Azimuthal electric fields are found whose net effect is to increase the outward radical transport of plasma across the magnetic field. A discussion of this phenomenon in terms of a previously described theory is given. (Author)

AD-617 051 Div. 25/1, 25/6

Purdue Univ., Lafayette, Ind.
DETERMINATION OF THE CYCLOTRON EFFECTIVE MASS FOR NONEXTREMAL ORBITS IN METALS,
by John J. Quinn and Sergio Rodriguez. 14 Oct 64, 4p
AROD 3655:8
Unclassified report

Pub. in Physical Review v137 n5A pA1400-3 Mar 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ultrasonic radiation, Attenuation), (*Metals, Ultrasonic radiation), (*Atomic energy levels, Metals), Temperature, Magnetic fields, Cyclotron resonance phenomena, Relativity theory, Shear stresses, Solid state physics.

A study is made of the temperature dependence of the amplitude of the quantum oscillations of the ultrasonic attenuation in metals in a magnetic field. We consider shear waves propagating parallel to the applied magnetic field in a material characterized by energy surfaces where the energy is an arbitrary function of wave vector. We find oscillations whose periods are inversely proportional to specific cross-sectional areas of nonextremal orbits on the Fermi surface. The temperature dependence of the amplitude of the oscillations is found to be a function of the cyclotron effective mass of electrons on these nonextremal orbits. (Author)

AD-617 052 Div. 25/4, 25/6

Delaware Univ., Newark. Dept. of Physics.
FRANZ-KELDYSH-EFFECT FOR APPRECIABLE DEFLECTION OF LIGHT BEAMS.
Short notes,
by K. W. Boer. 11 Feb 65, 3p
AROD 4461:3
Unclassified report

Pub. in Physica Status Solidi v8 pK179-80 1965 (Copies available only to DDC users).

Descriptors: (*Light pulses, Deflection), (*Optics, Light transmission), (*Semiconductors, Optical properties, Crystals, Refractive index, Dielectrics.

AD-617 054 Div. 25/6, 25/7

Texas Instruments, Inc., Dallas.
ELECTRON PARAMAGNETIC RESONANCE OF IRON IN INDIUM ARSENIDE,
by Thomas L. Estle. 16 Jul 64, 3p
Contract AF49 638 1250, Proj. 9761, Task 976103
AFOSR 65-0773
Unclassified report

Pub. in Physical Review v136 n6A pA1702-4 Dec 14 1964. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Iron, Ions), (*Paramagnetic resonance, Iron), (*Indium alloys, Arsenic alloys), Atomic energy levels, Electron transitions, Impurities, Hyperfine structure, Single crystals, Crystal structure, Semiconductors, Intermetallic compounds.

The electron-paramagnetic-resonance spectrum of the 3d5 configuration of iron in cubic symmetry has been observed in iron-doped indium arsenide. The spin-Hamiltonian parameters describing this spectrum are g=2.035 ±0.0002 and a =+(421±1)X0.0001/cm. The inhomegeneously broadened line is approximately 130 G wide. A comparison is made with the Mossbauer effect of Fe57 in InAs studied by Bemski and Fernandes. The results are discussed in terms of charge-transfer configuration admixtures introduced by Fidone and Stevens and elaborated by Watanabe and co-workers. (Author)

AD-617 063 Div. 20/2
CFSTI Prices: HC$3.00 MF$0.75

Oxford Univ. (England). Dept. of Nuclear Physics.
COSMIC RAY EFFECTS FROM ASSAY OF HELIUM ISOTOPES.
Final rept.,
by K. I. Mayne. Jan 65, 105p
Contract AF61 052 596
AFCRL 65-329
Unclassified report

Descriptors: (*Cosmic rays, Spallation), (*Helium, Isotopes), (*Spallation, Helium), Protons, Diffusion, Gases, Metals, Mass spectroscopy, Spectrum analyzers.

A high-sensitivity mass spectrometer was developed. Samples of 10,000,000 atoms total can be analyzed. It was applied to measuring the spallation production of rare gas isotopes in foils exposed to cosmic radiation. Diffusion effects were studied and cross-sections measured.

AD-617 064 Div. 25/6
CFSTI Prices: HC$6.00 MF$1.50

Louisiana State Univ., Baton Rouge. Dept. of Engineering Mechanics.
A STUDY OF THE BEHAVIOR OF THICK CYLINDRICAL SHELLS.
Final rept. for 4 Feb 63-4 Feb 64,
by Dale R. Carver, Edwin R. Chubbuck, and Robert L. Thoms. Apr 65, 242p
Contract AF29 601 5836, Proj. 5710, Task 13158
WL TR-64-64 Unclassified report

Descriptors: (*Structural shells, Cylindrical bodies), (*Loading(Mechanics), Structural shells), Rings, Thickness, Stresses, Mathematical analysis, Structures, Deformation, Programming(Computers), Statics, Dynamics, Difference equations, Series.

The report describes three approaches to the problem of predicting stresses and displacements in thick cylin-

drical shells. Section I is an analysis of a ring or segment of an infinitely long thick cylindrical shell based upon the simplifying assumptions of the Winkler curved beam theory. Dynamic loading of thick rings is treated in Chapter 2 of Section I. Section II consists of a static analysis of the thick-walled circular cylinder (or ring) by the elasticity approach developed by N. I. Muskhelisvili. Shear and radial stresses on the inner boundary, outer boundary, or both boundaries constitute the loading. A rather complete theoretical development is followed by a computer program and instructions for its use. Section III presents an analysis of static stresses in axially loaded thick-walled cylinders with end caps. This axisymmetric elasticity problem is solved by finite difference techniques and Southwell stress functions. Cylinders with one end closed by either a flat or a hemispherical cap are analyzed and an example worked for each case. Cylinders with both ends capped are analyzed in the final portion of the report. (Author)

AD-617 066 Div. 9/4
CFSTI Prices: HC$3.00 MF$0.75

Pittsburgh Univ., Pa.
DETERMINATION OF THE RELATIONSHIP OF CONSTRICTION PRESSURE LOSS TO THE RE-EXPANSION LOSS IN SUDDEN REDUCTION OF CROSS-SECTIONAL AREA FOR A SINGLE PHASE FLUID FLOW.
Master's thesis,
by Charles Edward Dorgan. 1965, 99p
Contract AF33 608 1104

Unclassified report

Descriptors: (*Pipes, Fluid flow), (*Fluid flow, Pressure), Reduction, Hydraulic systems, Friction, Statistical analysis, Incompressible flow, Programming-(Computers), Experimental data.

The purpose of the thesis is to investigate the relative losses in pipes for sudden contraction of a single phase fluid. A sudden contraction is defined as an immediate reduction in the flow cross sectional area. The objectives are to determine the losses of a sudden contraction by experimental tests and correlate these losses with the various flow parameters. (Author)

AD-617 078 Div. 25/7, 25/3
CFSTI Prices: HC$3.00 MF$0.75

Maryland Univ., College Park.
MEASUREMENT OF THE STARK WIDTHS AND SHIFTS OF NITROGEN ION LINES.
Scientific rept. no. 4 (final) for May 61-May 65,
by Richard A. Day. May 65, 96p
Contracts AF19 628 269, Nonr59510, Proj. 8647, Task 864701
AFCRL 65-348

Unclassified report

Descriptors: (*Line spectrum, Electric fields), (*Nitrogen, Line spectrum), Ions, Plasma medium, Temperature, Shock tubes.

A hot plasma composed of helium and ionized nitrogen was created by reflecting the shock wave produced in an electromagnetic T-tube. The plasma temperature was measured by monitoring three nitrogen ion lines, whose intensity is a steep function of temperature. The profiles of various lines emitted in the plasma were obtained by scanning a monochromator from shot to shot. The half width of HeI 3889A was compared to empirically corrected calculations to obtain the electron density. The half widths of the nitrogen ion lines were measured from the impact broadened profiles; the shifts were obtained by comparing these profiles with unshifted lines from a pulsed capillary discharge. The results indicate agreement between experiment and a recent Stark broadening theory within 20% except for lines originating from the 4f level where Debye screening effects are important. No evidence was found for plasma polarization shift. (Author)

AD-617 085 Div. 8/5
CFSTI Prices: HC$3.00 MF$0.75

Kansas State Univ., Manhattan.
AN INVESTIGATION OF PULSE DURATION MODULATION.
Master's thesis,
by Billy F. Lucas. 1965, 56p
Contract AF33 608 1076

Unclassified report

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Descriptors: (*Pulse modulation, Communication theory), (*Communication theory, Pulse modulation), Transistor amplifiers, Switching circuits, Time, Functions, Time-lag theory, Filters(Electromagnetic waves), Sidebands, Distortion.

This investigation shows that a pulse duration modulation system can be made to work with low distortion. A simple four-section RC filter with a tuned circuit for carrier rejection was used to recover the signal. At the beginning of the investigation an attempt was made to measure the magnitude of each sideband using a harmonic wave analyzer. This method did not work because different sidebands fall at the same frequency (or within a few cycles) and gave readings very difficult to decipher. A small drift in either frequency (especially the signal multiples of it appear in the sidebands) caused all sidebands to drift. Since lower and upper sidebands drifted in opposite directions with a frequency change two successive readings could disagree drastically.

AD-617 087 Div. 25/6, 25/4
CFSTI Prices: HC$4.00 MF$1.00

Autonetics, Anaheim, Calif.
ELECTRO-OPTIC PROJECTION STUDY.
Final rept. for Dec 63-Dec 64,
by R. S. Stites, W. E. Meyer, and C. L. Buddecke.
Apr 65, 135p
Contract AF30 602 3263, Proj. 5597, Task 559702
RADC TR-65-25

Unclassified report

Descriptors: (*Electron optics, Display systems), Feasibility studies, Light, Modulators, Control surfaces, Single crystals, Potassium compounds, Phosphates.

This study had as its objective the investigation and evaluation of an image projection technique which utilizes the longitudinal Pockel's effect for light modulation. The light valve tubes used in the study employ an electron beam to develop discrete electric fields through an electro-optic material. These fields induce an optical birefringence in the material which is transformed into proportional intensity modulation of a light beam. Characteristics of two electro-optic materials, potassium dihydrogen phosphate and potassium dideuterium phosphate, were measured in order to optimize the design of the light valve tube. The device was fabricated and demonstrated an ability to project live television

imagery. Operating parameters were determined for use in synthesizing an image projection system capable of presenting bright, large scale dynamic displays for command and control applications. (Author)

AD-617 088 Div. 25/6, 11/3, 30/2
CFSTI Prices: HC$2.00 MF$0.50

Holman (John F.) Co., Washington, D. C.
PRINCIPLES OF PROGRAMMING AND SOLVING PROBLEMS OF TRACTION AND DYNAMICS OF ELECTRICALLY DRIVEN ROLLING STOCK BY MEANS OF ELECTRONIC COMPUTERS,
by I. P. Isaev, V. A. Molodikov, and I. V. Biryukov.
Jul 65, 30p
Contract DA44 009AMC930T
AERDL T-1791-65, TT 65-62524
Unclassified report

Trans. of mono. Osnovy Programmirovaniya i Reshenei Zadach Tyagi i Dinamiki Elektropodvizhnogo Sostava na Elektronnykh Vychislitelnykh Mashinakh, Moscow, 1962, p165-87.

Descriptors: (*Locomotives, Dynamics), (*Programming-(Computers), Harmonic analysis), Motion, Perturbation theory, Linear systems, Nonlinear systems, USSR.

The oscillations of a system with one degree of freedom are considered, including: free oscillations of a linear system; that of a nonlinear system; the forced oscillations of a nonlinear system. The simplest harmonic perturbation of a nonlinear system with two degrees of freedom which follows a cosine law is discussed. A complex aperiodic perturbation is considered whose law of variation is given by means of a graph.

AD-617 102 Div. 25/1, 25/2
CFSTI Prices: HC$1.00 MF$0.50

Army Electronics Command, Fort Monmouth, N. J.
ELASTIC CONSTANTS OF AND WAVE PROPAGATION IN ANTIMONY AND BISMUTH.
Technical rept.,
by Seymour Epstein and Alex P. de Brettville, Jr.
Mar 65, 23p Rept. no. ECOM-2577
Proj. 1P6 22001A056, Tasks 1P6 22001A056 03, 1P6 22001A056 03 13
Unclassified report

Descriptors: (*Antimony, Ultrasonic radiation), (*Bismuth, Ultrasonic radiation), (*Ultrasonic radiation, Metallic crystals), Single crystals, Elasticity, Refraction, Phonons, Crystal structure.

Ultrasonic wave velocities for 14 different modes were obtained on two differently oriented single crystal antimony cubes from the time between successive unrectified radio frequency pulse echoes. This redundant set of data was fitted by a least squares technique to Voigt theory to yield the six room temperature adiabatic elastic stiffness constants. In units of 10 to the 10th power dynes/sq cm, c sub 11 = 99.4(1), c sub 33 = 44.5(9), c sub 44 = 39.5(5), c sub 66 = 34.2(3), c sub 13 = 26.4(4), c sub 14 = +21.6(4), the positive sign for c sub 14 following from our choice of positive Cartesian axes. When similarly treated, Eckstein, Lawson, and Reneker's bismuth data yield in these same units c sub 11 = 63.22, c sub 33 = 38.11, c sub 44 = 11.30, c sub 66 = 19.40, c sub 13 = 24.40 ±.09, c sub 14 = +7.20. Also included are a visual method of fixing the laboratory coordinate system in antimony by means of an imperfect cleavage plane, a calculation of the pure mode directions in the mirror plane, a simple formula for choosing the nonextraneous value of c sub 13 for trigonal crystals having six independent elastic constants without resorting to lattice stability criteria, and a calculation of the deviation of elastic wave particle displacement and energy flux directions from the propagation direction. For waves propagating in the (0,1,1) and (0,1,1) directions, the particle displacement deviations for antimony and bismuth do not exceed 15 degrees and 13 degrees respectively, and corresponding energy flux deviations up to 45 degrees and 27 degrees are obtained. (Author)

AD-617 105 Div. 25/6
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
MOVING LOADS ON THE SURFACE OF A CYLINDRICAL BORE IN AN INFINITE ELASTIC MEDIUM: PART II. THEORETICAL ANALYSIS OF STEP LOADS,
by M. L. Baron, J. M. McCormick, and G. Modiano. May 65, 79p Memo. no. RM-4419-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Cylindrical bodies, Loading(Mechanics)), Dynamics, Surfaces, Continuum mechanics, Elasticity, Theory, Mathematical analysis, Tables, Stresses, Velocity.

The memorandum considers the following three cases of moving step loads: the direction of the load normal to the surface, tangential to the surface in the direction of the axis of the bore, and tangential to the circle of load application. The memorandum determines the stresses and displacements produced in the elastic medium by each of the moving loads. These results can be used, by superposition, to determine the effects of other load patterns moving with the velocity V in the direction of the axis of the bore.

AD-617 106 Div. 25/6, 13/4
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MOVING LOADS ON THE SURFACE OF A CYLINDRICAL BORE IN AN INFINITE ELASTIC MEDIUM: PART III. SOME APPLICATIONS OF THE THEORY,
by R. Parnes and M. L. Baron. May 65, 49p
Memo. no. RM-4420-PR
Contract AF49 638 700
Unclassified report

See also AD-617 105.

Descriptors: (*Cylindrical bodies, Loading(Mechanics)), Dynamics, Drills, Underground structures, Numerical analysis, Shock waves, Theory, Surfaces, Elasticity, Continuum mechanics.

Applications may include the design and analysis of vertical access shafts to deep underground installations and of certain relatively deep missile silos, analysis of shock diffraction problems involving cylindrical tunnels in which the direction of the shock wave is not normal to the tunnel axes, and examination of certain areas of experimentation. The problem of vertical shafts in the superseismic region of a nuclear blast is considered in detail. This problem is represented by an applied normal step load that travels with a constant velocity along the surface of a semi-infinite homogeneous and isotropic elastic medium. The velocity of the moving load is superseismic, i.e., it is greater than the propagation velocities of the P and S waves in the medium. The shaft is represented by a cylindrical bore in the medium, normal to its surface and closed at the top. The maximum stresses at the surface of the bore resulting from the effect of the moving load are evaluated. These stresses

represent the effect of the P wave; the shear wave arrives later and acts to reduce the stress levels at the cavity boundary. Numerical results are given for the hoop, longitudinal, the shear stresses at several locations of the cavity boundary and for two velocities of the moving load, a low and a high superseismic velocity. (Author)

AD-617 109 Div. 25/6, 25/3, 9/1, 25/4
CFSTI Prices: HC$2.00 MF$0.50

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
THE FORCE DENSITY IN POLARIZABLE AND MAGNETIZABLE FLUIDS.
Technical rept.,
by L. J. Chu, H. A. Haus, and P. Penfield, Jr.
1 Jun 65, 43p Rept. no. TR-433
Contract DA36 039AMC03200E

Unclassified report

Descriptors: (*Force(Mechanics), Electromagnetism), (*Fluid flow, Electromagnetic fields), (*Electromagnetism, Continuum mechanics), Relativity theory, Polarization, Magnetic fields, Thermodynamics, Deformation, Mathematical prediction, Energy, Pressure, Power.

The force density in polarizable and magnetizable fluids in nonuniform motion is evaluated in a way that is consistent with the special theory of relativity. The derivation is based on a generalization of the principle of virtual work. For application of the principle, it is necessary to know the energy density and power-flow density in a local rest frame of the fluid element under consideration. These are obtained from thermodynamic information and an extrapolation of the Poynting theorem applied to a rigid, nondeforming medium. Two different formulations of electrodynamics of moving and deforming media are compared. It is shown that they lead to the same force density if the same thermodynamic information is used in each of them. A simple model for the force density is obtained, starting from the E-H formulation. (Author)

AD-617 117 Div. 25/3, 30/5, 8/2
CFSTI Prices: HC$2.00 MF$0.50

Harry Diamond Labs., Washington, D. C.
CIRCUITRY AND OPERATION OF AN X-BAND INTERFEROMETER FOR SHOCK-TUBE MEASUREMENTS USING THE DIELECTRIC SLAB APPROXIMATION,
by J. C. Blackburn and F. L. Tevelow. 22 Apr 65,
46p Rept. no. TR-1275
Projs. DA1A010501B010, 36600

Unclassified report

Descriptors: (*Interferometers, X band), (*Shock tubes, Interferometers), (*Plasma medium, Electrical properties), Circuits, Calibration, Microwave equipment, Waveguides, Electron density, Propagation.

The experimental methods and equipment used in analyzing transient shock-generated plasmas by X-band microwave interaction techniques are presented in considerable detail. A transmission technique (for electron densities of 10 to the 10th power to 10 to the 13th power electrons/cc) and a reflection technique (extending the range to about 10 to the 16th power electrons/cc) are discussed with respect to the construction and adjustment of the microwave apparatus and the required data reduction. An evaluation of the experimental errors due to the electronic equipment and data reduction procedure is given. (Author)

AD-617 121 Div. 20/1, 2/7
CFSTI Prices: HC$2.00 MF$0.50

Uppsala Univ. (Sweden).
COSMIC RAY INTENSITY VARIATIONS DURING 1964.
Technical note,
by A. E. Sandstrom, E. Dyring, L. Ekstrom, S. Lindgren, and B. Sporre. 30 Mar 65, 27p
Rept. no. TN-1
Grant AF EOAR64 64
AFCRL 65-349

Unclassified report

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Continuation of Contracts AF61 514 1312, AF61 052 614.

Descriptors: (*Cosmic rays, Intensity), (*Periodic variations, Cosmic rays), Diurnal variations, Tables, Geophysics.

Cosmic ray intensity variations were recorded by one neutron monitor, two cubical telescopes and six inclined telescopes in Uppsala and Kiruna. Tables and figures give a detailed account of diurnal and semidiurnal variations during 1964. Only one decrease is illustrated in an one-hour diagram. (Author)

AD-617 125 Div. 25/6, 25/2

Cincinnati Univ., Ohio.
EXCITON STRUCTURE IN PHOTOCONDUCTIVITY OF CdS, CdSe, AND CdS:Se SINGLE CRYSTALS.
Revised ed.,
by Y. S. Park and D. C. Reynolds. 23 Jul 63, 10p
ARL 65-56

Unclassified report

Pub. in Physical Review v132 n6 p2450-7 Dec 15 1963
(Copies not available to DDC or Clearinghouse customers)
Revision of manuscript submitted 24 Jun 63.

Descriptors: (*Cadmium compounds, Photoconductivity), (*Cadmium alloys, Photoconductivity), (*Single crystals, Cadmium compounds), (*Photoconductivity, Cryogenics), Semiconductors, Selenium alloys, Sulfides, Atomic energy levels, Electron transitions, Excitation, Intermetallic compounds, Ground state, Solid solutions, Absorption spectrum.

Exciton-like structure has been observed in the photoconductive spectral response curves of CdS, CdSe, and CdS:Se single crystals at 77 and 4.2K. It is observed that a number of peaks in the photoconductivity spectra of CdS and CdSe correspond to the exciton spectra identified by other optical measurements. In CdS the photoconductivity peaks corresponding to n = 1, 2, 3 states and the series limit of the exciton from the first and second valence bands and the ground state of the exciton associated with the third valence band were observed. For CdSe the peaks corresponding to the n = 1, 2, 3 states of the exciton from the first and second valence bands were identified. Only the ground state was identified in the solid solutions. Assignment of the observed photoconductivity peaks was carried out by observing optical selection rules in polarized light. Within a given series the peaks form nearly hydrogen-like energy spacings, and it is observed that the exciton absorption lines always corresponded to photocurrent maxima. (Author)

AD-617 126 Div. 20/2
CFSTI Prices: HC$3.00 MF$0.75

Texas Nuclear Corp., Austin.
COMPILATION OF NEUTRON REACTION AND TOTAL CROSS SECTIONS AT 14 MEV.
Rept. for 1 Jan 63-31 Jan 64,
by Suresh C. Mathur, John B. Ashe, and Ira L. Morgan. Apr 64, 76p
Contract AF33 616 8160, Proj. 7360, Task 736005
ASD TDR-62-1038 P3 V2 Unclassified report

Descriptors: (*Neutron reactions, Neutron cross sections), (*Neutron cross sections, Neutron reactions), Gamma-ray spectra, Neutron activation, Alpha decay, Proton bombardment.

A list of cross section data and related information was compiled for total neutron cross sections and the reaction cross sections, (n,p), (n, alpha), and (n,2n) in the energy region around 14 Mev. This compilation includes published data through June 1963. A gamma ray spectral atlas containing 54 sets of spectra of some of the more common elements in the periodic table was obtained by activation analysis with 14.8 Mev neutrons. A one and a five minute irradiation of each element was made and spectra recorded at various times after irradiation to emphasize decay characteristics of the radioactive products from the irradiated element. Gamma ray peaks from the reaction products were identified as well as radioactive decay products from trace impurities in each element whenever possible. Carbon and nitrogen surface contamination of several high purity beryllium samples were measured by proton irradiation. The results seem to indicate that a large percentage of this contamination is in surface layers suggesting that these contaminants may have been added during a machining process. (Author)

AD-617 130 Div. 25/3
CFSTI Prices: HC$4.00 MF$1.00

Boeing Scientific Research Labs., Seattle, Wash.
REVIEW OF MAGNETOFLUIDDYNAMIC APPLICATIONS,
ed. by T. E. Turner. Apr 65, 148p
Rept. nos. D1-82-0435, FSL-96
Unclassified report

Also available from the author.

Descriptors: (*Magnetohydrodynamics, Scientific research), Generators, Electric propulsion, Space propulsion, Plasma physics, Wind tunnels, Flight control systems, Boundary layer, Shock tubes, Reviews.

A critical evaluation of possible important mfd applications is given. The nature of the limitations that stand in the way of these practical applications is examined and judgements made as to whether these limitations are fundamental in nature or whether they might be overcome by further research. In the event of the latter, specific avenues of research are suggested. Magnetofluiddynamic generators, accelerators, wind tunnels, flight controls, boundary layers, and shock tubes are considered.

AD-617 135 Div. 20/2, 20/6
CFSTI Prices: HC$1.00 MF$0.50

Naval Radiological Defense Lab., San Francisco, Calif.
FALL-OUT AND AIRBORNE ACTIVITY IN OPERATION WIGWAM, WITH NOTES ON SURFACE EFFECTS,
by Frederic A. French. May 55, 22p
Proj. 2 7
WT 1017; ITR 1087, superseded
Unclassified report

Rept. on Operation Wigwam.

Descriptors: (*Nuclear explosions, Radioactive fallout), (*Radioactive fallout, Nuclear explosions), (*Underwater explosions, Nuclear explosions), Radiation tolerance, Lethal dosage, Radiation effects, Markers, Dyes, Fluorescence, Radiological damage.

Conclusions: The Wigwam deep underwater nuclear detonation produced sufficient airborne activity to have given radiation doses many times tolerance (i.e., about 30 r) to exposed personnel located approximately 5 miles downwind, but the magnitude of airborne activity closer to surface zero was not measured. There was no visible fall-out cloud transporting the material from the region above surface zero to the downwind point of detection, but analysis of the airborne activity does give evidence of the venting of the bubble material. An order of magnitude estimate indicates an amount of airborne activity of the order of 1 per cent of the total activity. The dosimeter data, which are generally corroborated by the aerial survey data, indicate the existence of a radiation field in the water near surface zero at early times sufficient to give lethal dosages to personnel immobilized either in that water or on lightly shielded ships immobilized there. The fluorescein dye gave a surface zero region marking of operational utility. (Author)

AD-617 136 Div. 25/6
CFSTI Prices: HC$2.00 MF$0.50

Institute of Engineering Research, Univ. of California, Berkeley.
SYMMETRIC DEFORMATIONS OF VISCOELASTIC-PLASTIC CYLINDERS,
by M. J. Crochet. Mar 65, 37p Rept. no. AM-65-1
Contract Nonr22281, Proj. NR064 449
Unclassified report

Descriptors: (*Cylinderical bodies, Deformation), (*Deformation, Cylinderical bodies), Viscoelasticity, Plasticity, Pressure, Strain(Mechanics), Stresses, Mathematical analysis, Numerical analysis.

The paper contains a general solution for a viscoelastic-plastic hollow circular cylinder under internal pressure and in the state of plane strain. The medium is assumed to be isotropic and homogeneous, and the constitutive equations used are a special case. Solutions for both loading and unloading from a viscoelastic-plastic sxtate are considered and numerical results are obtained for the specific case of an incompressible cylinder under a step pressure. Also discussed briefly is the torsion of a viscoelastic-plastic cylinder, the solution of which is again illustrated by a numerical example. (Author)

AD-617 137 Div. 25/6, 13/4
CFSTI Prices: HC$2.00 MF$0.50

Institute of Engineering Research, Univ. of California, Berkeley.
DEFORMATION OF AN ELASTIC SPHERICAL WEDGE,
by R. M. Christensen. Mar 65, 26p
Rept. no. AM-65-2
Contract Nonr22281, Proj. Nr064 449
Unclassified report

Descriptors: (*Wedge, Deformation), (*Deformation, Wedge), Elasticity, Spheres, Viscoelasticity, Stresses, Boundary value problems, Mathematical analysis, Mechanics.

Analytical solutions are presented for two separate modes of deformation of an infinite elastic spherical wedge. In part, these solutions take the form of the stresses on the boundaries of the wedge caused by prescribed surface displacements. Full discussion is given to the means of utilizing these two solutions, along with corresponding tests, to determine the complete mechanical properties characterization of a linear isotropic viscoelastic solid. (Author)

AD-617 138 Div. 9/1
CFSTI Prices: HC$3.00 MF$0.75

Boeing Scientific Research Labs., Seattle, Wash.
AN EXPERIMENTAL INVESTIGATION OF MASS FLOW THROUGH SHORT CIRCULAR TUBES IN THE TRANSITION FLOW REGIME.
Flight sciences laboratory rept.,
by A. K. Sreekanth. Apr 65, 72p
Rept. nos. FSL-95, D1-82-0427
Unclassified report

Descriptors: (*Gas flow, Pipes), (*Fluid mechanics, Gas flow), Nitrogen, Kinetic theory, Orifices, Experimental data, Graphics, Tables.

The mass flow of nitrogen gas through short circular tubes was measured in the transition flow regime with the length-to-diameter ratios varied between 0.005 and 1 and with pressure ratios across the tubes varied between 1 and 20. The range of Knudsen numbers (ratio of upstream mean free path to the diameter of the tube) covered was between 0.1 to 1.7. Comparisons are made of the measurements with existing theories, and semi-empirical equation is developed to correlate the measured data at all of the pressure ratios, Knudsen numbers, and length-to-diameter ratios covered in the present study. (Author)

AD-617 142 Div. 9/1
CFSTI Prices: HC$3.00 MF$0.75

American Science and Engineering, Inc., Cambridge, Mass.
A NEW METHOD OF PRODUCING HIGH SPEED MOLECULAR BEAMS.
Final rept. for 15 May 64-17 Mar 65,
by Lester A. Sodickson, Jack W. Carpenter, and Gilbert Davidson. 17 Mar 65, 65p Rept. no. ASE-933
Contract AF19 628 4047, Proj. 4076, Task 407604
AFCRL 65-337
Unclassified report

Descriptors: (*Molecular beams, Gas flow), (*Gas flow, Molecular beams), (*Kinetic theory, Gas flow), Sabot projectiles, Light gas guns, Hypersonic flow, Acceleration, Vibration, Excitation, Nitrogen, Carbon dioxide, Infrared radiation.

A new method of producing a pulsed, cold beam of high velocity neutral molecules is shown to be feasible. A hollow container filled with a chosen gas is mechanically accelerated to a high velocity in a rifle or light gas gun. The container (called a sabot) is subsequently opened to allow the gas to emerge. The sabot is then slowed or deflected. Velocities up to about 3 km/sec can be achieved with a Super Swift rifle and up to about 10 km/sec with a light gas gun. It appears feasible to produce a pulsed beam at 10 km/sec with an angular divergence of ± 2.5 degrees and a spread in velocity of ± 4%. A 5 micro sec pulse with an instantaneous intensity of the order of 2 x 10 to the 23rd power molecules/sq cm -sec can be achieved. A beam of N2 crossed with a low velocity beam of CO or CO2 produces vibrationally excited molecules in sufficient quantity to be detected with state-of-the-art techniques. It appears feasible to measure the cross sections for collisional excitation of the vibrational levels of CO2 and CO by N2, and the cross sections for the exchange of vibrational energy between N2 and CO2 or CO. The total cross section, which gives the mean free path, can also be obtained. (Author)

AD-617 149 Div. 20/2, 13/10
CFSTI Prices: HC$12.00 MF$1.25

IIT Research Inst., Chicago, Ill.
STUDY OF DRAG LOADING OF STRUCTURES IN THE PRECURSOR ZONE,
by L. A. Schmidt. 30 Jan 59, 172p
Contract AF33 616 2666, Proj. 3 2
WT 1124
Unclassified report

Report on Operation Teapot, Nevada test site Feb-May 55.

Descriptors: (*Structures, Loading(Mechanics)), (*Nuclear explosions, Explosion effects), (*Shock-waves, Drag), Blast, Mathematical analysis, Tests, Feasibility studies, Aerodynamic loading.

The specific objectives of the project were to: (1) establish a body of information to be used as a basis for model experiments; (2) investigate the drag-loading phenomena associated with precursor and nonprecursor shocks and to obtain quantitative data to be used as a basis for deriving methods for predicting drag loads on simple shapes; and (3) determine the feasibility of one method of measuring net forces under nuclear test conditions.

AD-617 151 Div. 25/6
CFSTI Prices: HC$2.00 MF$0.50

Technion - Israel Inst. of Tech., Haifa. Dept of Aeronautical Engineering.
GENERAL INSTABILITY OF CONICAL SHELLS WITH NON-UNIFORMLY SPACED STIFFENERS UNDER HYDROSTATIC PRESSURE.
Scientific rept.,
by Menahem Baruch, Josef Singer, and Ovadia Harari.
Dec 64, 44p Rept. nos. SR-1, TAE-37
Grant AF EOAR63 58
Unclassified report

Descriptors: (*Structural shells, Hydrostatic pressure), (*Conical bodies, Stability), Rings, Reinforcing materials, Tensile properties, Moments, Force(Mechanics), Numerical analysis, Buckling(Mechanics), Israel, Pressure vessels, Configuration, Optimization.

The method of analysis of the general instability of stiffened conical shells, developed earlier by the authors for uniform and equally spaced stiffeners, is now extended to shells with non-uniformly spaced stiffeners. For hydrostatic pressure loading, rings are the most efficient stiffeners. On account of the cone geometry, equally spaced rings divide a conical shell into 'sub-shells' of unequal local buckling strength. Hence unequal spacings, which result in 'sub-shells' of equal local buckling strength, are the logical approach to an optimum structure. A rule for such spacings is derived and discussed. The analysis is then given for conical shells with rings spaced according to rules of this type. Numerical calculations are presented and discussed. A simplified approximate formula for the critical pressure is also proposed. (Author)

AD-617 152 Div. 20/2, 13/10, 30/3
CFSTI Prices: HC$8.60 MF$0.75

Ballistic Research Labs., Aberdeen Proving Ground, Md.
TRANSIENT DRAG CHARACTERISTICS OF A SPHERICAL MODEL.
Final rept.,
by Henry S. Burden. Jan 57, 96p
Proj. 1 14a
WT 1114

Unclassified report

Rept. on Operation TEAPOT, Nevada Test Site, Feb-May 55.
Declassified 5 Jul 61.

Descriptors: (*Spheres, Drag), (*Blast, Nuclear explosions), Measurement, Nuclear explosion damage, Gas flow, Pressure, Force(Mechanics), Meters, Recording systems.

The measurement of aerodynamic drag forces exerted on simple shapes subjected to the air flow of a blast wave is described. Gages were designed and tested for the measurement of drag forces on simple geometrical shapes.

AD-617 155 Div. 20/2, 9/1
CFSTI Prices: HC$6.60 MF$0.75

Sandia Corp., Albuquerque, N. Mex.
SPECIAL MEASUREMENTS OF DYNAMIC PRESSURE VERSUS TIME AND DISTANCE,
by J. R. Banister and F. H. Shelton. 28 Feb 58, 70p
Proj. 1 11
WT 1110

Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Nuclear explosions, Atmosphere), (*Fluid mechanics, Nuclear explosions), Shock waves, Pitch(Motion), Yaw, Functions, Time, Barometric pressure, Earth, Terrain, Correlation techniques.

Pitch and yaw of shock afterflow as a function of time, dynamic pressure parameters, and the contributions of air and dust to dynamic pressure were measured over desert, asphalt, and water surfaces during a nuclear explosion. Little or no yaw of flow was detected, but pitch of flow was found to be considerable over all three surfaces to 2,500 feet from ground zero. Over desert and asphalt, pitch-time records displayed a consistent pattern of initial upward flow followed by horizontal flow, or at 2,500-foot stations, downward flow. Pitch-time records over water are erratic and little understood. Air dynamic pressures at 3-foot elevations, 2,000 and 2,500 feet from ground zero, were highest over desert and higher over asphalt than water. Considerable dust loading occurred on the desert where dust dynamic pressure exceeded that of air. Particle loading was present over asphalt, but the extent was not determined. No tangible evidence of water loading was found. Results suggest that high air dynamic pressures over desert and asphalt arise from air velocities higher than would be expected from the Rankine Hugoniot relations and measured overpressures. (Author)

AD-617 156 Div. 25/3, 17/6
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
ELECTRIC RESISTANCE OF ORDERED ALLOYS WITH A HEXAGONAL CLOSE-PACKED CRYSTALLINE LATTICE,
by Z. A. Matysina, A. I. Nosar, and A. A. Smirnov.
19 May 65, 10p FTD-TT-65-84
TT 65-62540

Unclassified report

Unedited rough draft trans. of Akademiya Nauk URSR, Kiev. Instytut Metallofizyky. Sbornik Nauchnykh Rabot. v14 p121-5 1962.

Descriptors: (*Resistance(Electrical), Alloys), (*Alloys, Resistance(Electrical)), Crystal lattices, Crystal structure, Cadmium alloys, Magnesium alloys, USSR, Intermetallic compounds.

The residual electric resistance is considered of binary ordered alloys with a hexagonal close-packed crystalline lattice of the type AB and AB3 and comparisons are made of the results with experimental data for the alloys MgCd3 and Mg3Cd.

AD-617 159 Div. 25/4
CFSTI Prices: HC$1.00 MF$0.50

Foreign Technology Div., Wright-Patterson AFB, Ohio.
IRRADIATION ON THE SECOND OPTICAL HARMONICS,
by V. S. Mashkevich. 12 May 65, 9p FTD-TT-65-25
TT 65-62543

Unclassified report

Unedited rough draft trans. of Ukrayinskyi Fizychnyi Zhurnal (USSR) v9 n2 p226-9 1964.

Descriptors: (*Optical phenomena, Crystals), Lasers, Excitation, Probability, USSR.

Intense optical harmonics were obtained in crystals by laser irradiation.

AD-617 162 Div. 25/3, 30/5
CFSTI Prices: HC$1.00 MF$0.50

Vitro Labs., West Orange, N. J.
DEVELOPMENT OF NONCONSUMABLE ANODE FOR FLUID TRANSPIRATION INTO A HIGH-INTENSITY ARC.
Interim activities rept.,
by Charles Sheer. 30 Dec 59, 20p Rept. no. KLX-10179
Contract AF49 638 477
AFOSR 3676

Unclassified report

Descriptors: (*Anodes, Electric arcs), (*Electric arcs, Plasma jets), (*Evapotraspiration, Plasma medium), Plasma sheath, Fluids, Electrical conductance, Luminescence, Energy.

The investigation of plasma generators and plasma generating mechanisms has covered the energy-transfer potentialities of the conventional low-intensity arc, the fluid-stabilized arc, the solid-anode high-intensity arc and the nonconsumable-anode high-intensity arc. A nonconsumable anode was developed which features transpiration of a fluid medium through an anode having pores which are smaller in diameter than the anode sheath thickness. Experimental testing of this device demonstrated that a plasma jet of various fluids can be generated while the arc is maintained at the high-intensity level of operation. Some of the characteristics of this type of plasma generator were revealed.

AD-617 168 Div. 25/6
CFSTI Prices: HC$1.00 MF$0.50

Institute of Engineering Research, Univ. of California, Berkeley.
PLASTICITY THEORY AND MULTIPOLAR CONTINUUM MECHANICS.
Technical rept.,
by A. E. Green and P. M. Naghdi. Mar 65, 15p
Rept. no. AM-65-3
Contract Nonr22269, Proj. NR064 436
Unclassified report

Descriptors: (*Continum mechanics, Plasticity), (*Plasticity, Continum mechanics), Theory, Elasticity, Nonlinear systems, Strain(Mechanics), Tensor analysis, Motion, Differential equations.

In this paper, it is shown that the nonlinear theory of an elastic-plastic continuum in the form developed by Green and Naghdi (1965) may also be deduced as a special case of the theory of multipolar continuum mechanics (Green and Rivlin, 1964). (Author)

AD-617 169 Div. 25/6
CFSTI Prices: HC$1.00 MF$0.50

Institute of Engineering Research, Univ. of California, Berkeley.
A COMMENT ON DRUCKER'S POSTULATE IN THE THEORY OF PLASTICITY.
Technical rept.,
by A. E. Green and P. M. Naghdi. Apr 65, 14p
Rept. no. AM-65-4
Contract Nonr22269, Proj. NR064 436
Unclassified report

Descriptors: (*Plasticity, Theory), Continum mechanics, Thermodynamics, Deformation, Compressive properties, Stresses, Strain(Mechanics), Differential equations.

A general theory of an elastic-plastic continuum, valid for non-isothermal deformations and accompanied by explicit thermodynamical restrictions, was developed recently by Green and Naghdi. A special case of this theory, assuming isothermal conditions, leads to constitutive relations which are equivalent to those which can be derived from Drucker's postulate. Here, we discuss further the implication of Drucker's postulate in connection with a set of constitutive equations for an elastic-plastic continuum in which the postulate need not be satisfied. (Author)

AD-617 170 Div. 20/2, 9/1
CFSTI Prices: HC$14.00 MF$1.25

Ballistics Research Labs., Aberdeen Proving Ground, Md.
MEASUREMENTS OF AIR-BLAST PHENOMENA WITH SELF-RECORDING GAGES,
by E. J. Bryant, N. H. Ethridge, and J. H. Keefer.
16 Jul 59, 211p
Proj. 1 14b
WT 1155
Unclassified report

Report on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Airburst, Nuclear explosions), (*Nuclear explosions, Airburst), (*Fluid mechanics, Nuclear explosions), Atmosphere, Explosion effects, Measurement, Meters, Servomechanisms.

The self-recording mechanical gages developed for recording over-pressure versus time and dynamic pressure versus time were installed on 12 shots. For several shots more than one blast line was instrumented. In addition to these blast lines, gage stations were prepared in locations to meet specific data requirements, such as in the vicinity of structures, and in particular on a circle of gages at a radius of 2,500 feet on Shots 12 and 14. Furthermore, a very-low-pressure gage was employed to record the wave shapes and magnitudes at large distances from the explosions. Particular application of this gage was made on Shot 10. The gages performed well, and the results were a wealth of data on a wide range of yields for a variety of surface conditions. Tabulations are presented of peak overpressure, positive-phase duration and arrival times at ground surface, and peak dynamic pressure, peak total overpressure, and peak static overpressure at the 3-foot level. The curves for peak overpressure versus distance and peak dynamic pressure versus distance are shown plotted as observed and reduced to 1 KT at sea level in comparison with appropriate curves from TM 23-200 and ideal pressure-distance curves.

AD-617 171 Div. 20/2, 24/2
CFSTI Prices: HC$1.60 MF$0.50

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
TECHNICAL PHOTOGRAPHY.
12 Aug 57, 17p
Proj. 9 1
WT 1151 Unclassified report

Loading(Mechanics), Engineering geology, Civil engineering, Instrumentation, Nuclear explosions, Underground explosions, Pressure gages.

This project was planned and executed: (1) to determine the influence of certain parameters, especially structural flexibility, on the normal (perpendicular) loads generated against a structure by earth-propagated pulses resulting from underground explosions and (2) to inspect the damage to certain existing Operation Jangle structures and utilities within 1,000 feet of ground zero. To accomplish the objective, 15 flexible measuring devices were placed in the earth. All fifteen flexible measuring devices carried pressure gages at the center of the front face of the forward mass, and SR-4 strain gages were cemented to the outer surfaces of the torque tubes on eight of the devices. Six of these eight were fitted with accelerometers in the rear face of the forward mass. Three of the 15 flexible measuring devices were standard comparison devices, the flexibility and dimensions of which were arbitrarily selected. The twelve remaining devices were divided into four groups of three. Within each group of three devices one of the four parameters assumed to be of greatest importance in influencing dynamic structural flexibility was varied so as to study the influence of this particular parameter.

AD-617 172 Div. 20/2, 13/4
CFSTI Prices: HC$9.60 MF$1.00

Bureau of Yards and Docks, Washington, D. C.
FLEXIBLE MEASURING DEVICES AND INSPECTION OF OPERATION JANGLE STRUCTURES,
by C. O. Dohrenwend, L. D. Mills, J. S. Kinney, and E. E. Shalowitz. 28 Jul 58, 121p
Proj. 3 3 1
WT 1125
Unclassified report

Report on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Underground structures, Nuclear explosion damage), (*Nuclear explosion damage, Underground structures), Structures, Explosion effects,

Report on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Photographic techniques, Nuclear explosions), (*Nuclear explosions, Photographic techniques), Explosion effects, Recording systems, Photographic equipment.

The purpose of Project 9.1 was to furnish scientific and technical report photography and operational documentation as directed by the Military Effects Group. Three types of photographic services were rendered: (1) technical documentary photography as required by the scientific and technical programs, projects, and staff sections for the purpose of inclusion in their respective operational and technical reports; (2) zero-time technical photography, defined as film exposed in the vicinity of zero time, using cameras installed in the test area and controlled by the sequency timing signals utilized to initiate the overall test program; and (3) documentary motion-picture photography to document the technical and scientific aspects of the operation for personnel concerned in the results of Operation Teapot.

AD-617 173 Div. 20/2, 13/10
CFSTI Prices: HC$6.60 MF$0.75

Bureau of Yards and Docks, Washington, D. C.
EVALUATION OF EARTH COVER AS PROTECTION TO ABOVEGROUND STRUCTURES,
by R. B. Vaile, Jr. and L. D. Mills. Dec 56, 67p
Proj. 3 6
WT 1128

Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Shelters, Earth), (*Soil mechanics, Fortifications), (*Fortifications, Soil mechanics), Steel, Structures, Protective coverings, Vulnerability, Nuclear explosions, Nuclear warfare.

Earth-covered corrugated steel structures, both full-size and quarter-scale models, were tested. The tests were designed to obtain a measure of the blast resistance and the radiation resistance of this type of structure (a 25-foot span arch) if it were used for a personnel shelter. A full-scale structure successfully withstood peak pressures of 11-psi sideon and 30-psi dynamic on the open plain. Another full-scale structure failed under the load produced by peak pressures of 30-psi side-on and 170-psi dynamic on the open plain. Prompt radiation was attenuated by a factor of 100; the radiation resistance would be greatly improved by additional thickness of earth cover at the crown. The performance of the models was roughly consistent with expectations. Although further experimentation will be required before the reliability of the model results can be assured, the TEAPOT results suggest that static model tests prior to any further full-scale blast tests will enhance the value of the results, and will reduce the cost, of such full-scale operations. (Author)

AD-617 174 Div. 20/2, 13/10
CFSTI Prices: HC$9.60 MF$1.00

Air Force Special Weapons Center, Kirtland AFB, N. Mex.
EFFECT OF POSITIVE PHASE LENGTH OF BLAST ON DRAG AND SEMIDRAG INDUSTRIAL BUILDINGS, PART I,
by G. K. Sinnamon, J. D. Haltiwanger, F. Matsuda, and N. M. Newmark. 1 Dec 58, 120p
Proj. 3 7
WT 1129

Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55. Prepared in cooperation with Illinois Univ., Urbana.

Descriptors: (*Nuclear explosion damage, Buildings), (*Building, Nuclear explosion damage), (*Blast, Nuclear explosion damage), Vulnerability, Explosion effects, Industrial plants, Structures, Civil engineering, Nuclear explosions.

The objectives of this project were two fold. First, it was intended to obtain experimental evidence in support of the theoretical concept that the peak intensity of overpressure necessary to produce a given deflection of a drag or semidrag structure decreases as the duration of the positive phase of the blast wave increases. The second objective was the evaluation of present methods of predicting the response of drag and semidrag structures under relatively low intensity blast pressures and the utilization of the results of this project to refine and improve these methods.

AD-617 175 Div. 20/2, 13/10
CFSTI Prices: HC$7.60 MF$0.75

Illinois Univ., Urbana.
AIR BLAST EFFECTS ON UNDERGROUND STRUCTURES,
by R. E. Woodring, G. K. Sinnamon, and N. M. Newmark.
20 Aug 57, 81p
Proj. 3 4
WT 1127

Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Airburst, Nuclear explosion damage), (*Underground structures, Nuclear explosion damage), (*Nuclear explosion damage, Underground structures), Blast, Explosion effects, Reinforced concrete, Civil engineering, Engineering geology.

The general purpose of this project was to obtain the necessary basic data from which to develop criteria for the economical and efficient design of underground protection from air-blast forces. The specific objectives were: (1) to investigate the nature of the forces transmitted from an air burst of an atomic device through the earth to underground structures; (2) to determine the variation of these forces with the depth of the structure in the earth and with the flexibility of the structural elements; and (3) to study the response of simple structural elements of different stiffnesses and effective masses subjected to the transmitted dynamic forces.

AD-617 176 Div. 20/2, 8/2
CFSTI Prices: HC$1.60 MF$0.50

Army Electronics Labs., Fort Monmouth, N. J.
RADIATION EFFECTS ON SELECTED COMPONENTS AND MATERIALS,
by James B. Graham and J. A. Biggerstaff. 16 Aug 57, 21p
Proj. 6 2
WT 1139

Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Nuclear explosion damage, Electronic equipment), (*Electronic equipment, Nuclear explosion damage), (*Radiation damage, Electronic equipment), Nuclear weapons, Explosion effects, Electron tubes, Radar beacons, Crystals.

This project was implemented to study the performance of selected Signal Corps components and materials,

either in use or storage, after being subjected to the intense radiation from a nuclear device. It is essential to know both the reliability of present components under such conditions and the types of failures that occur after irradiation. This knowledge is useful as background for the development of new components and materials, and in evaluating the usability of stocks of present types of equipment in the event that they are subjected to intense radiation without sustaining blast or thermal damage. Several stations were set up at distances which resulted in exposure of 40,000 roentgens or higher. Since the ratios of gamma exposures to overpressures vary in the range of interest, participation was limited to events of comparatively large yield. Performance characteristics of each component were measured both prior to and after exposure. There was no noticeable interference with the normal functioning of the radar beacon or the electron tubes. In the case of the quartz crystals, measurable effects were noted. Further laboratory testing is necessary in order to assess that portion of the frequency shift which may have been caused by irradiation, as opposed to purely mechanical effects. (Author)

AD-617 178 Div. 20/2
CFSTI Prices: HC$1.60 MF$0.50

Naval Radiological Defense Lab., San Francisco, Calif.
SPECTROMETER MEASUREMENTS,
by W. B. Plum and W. J. Parker. 27 Jan 58, 22p
Proj. 8 4d
WT 1148
Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Nuclear explosions, Atmosphere), (*Spectrum analyzers, Nuclear explosions), Thermal radiation, Shock waves, Airburst, Emissivity, Distribution, Measurement.

This experiment was performed to obtain data on the spectral distribution of the radiation emitted in a nuclear explosion as a function of altitude. The radiant power versus time was measured with a time resolution of 100 micro sec in 22 narrow spectral bands between 0.25 and 2.5 microns for the high altitude detonation and for the low altitude correlation shots. This was accomplished with vacuum phototubes and lead sulphide photoconductive cells, each sampling a different spectral region in the focal plane of a medium quartz Hilger spectrograph. The voltages produced by these detectors were recorded on two Ampex Model 306 magnetic-tape recorders. The spectral distribution at any given instant was obtained by plotting the radiant power per unit wavelength interval as measured by each of these detectors at that time. The spectral distribution is published in this report at the time of the first maximum and at the time of minimum for Shots 1 and 10 and at the time of the second maximum and at several later times for Shots 1, 9, and 10. These spectral distributions indicate that the radiation reaching earth from the high altitude detonation was concentrated more in the shorter wavelengths than for the correlation shots.

AD-617 179 Div. 20/2
CFSTI Prices: HC$13.80 MF$0.75

Naval Radiological Defense Lab., San Francisco, Calif.
DISTRIBUTION AND INTENSITY OF FALLOUT FROM THE UNDERGROUND SHOT,
by R. L. Stetson, T. H. Shirasawa, M. M. Sandomire, S. Baum, and H. K. Chan. 14 Mar 58, 92p
Proj. 2 5 2
WT 1154 Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Radioactive fallout, Underground explosions), (*Underground explosions, Radioactive fallout), (*Nuclear explosions, Radioactive fallout), Distribution, Intensity, Gamma rays, Radiation measurement systems, Health physics, Nuclear explosion damage, Fission products.

One phase of the overall fallout studies on underground detonations was to make total fallout collections defining the magnitude and extent of the entire fallout event in terms of quantity of material dispersed and deposited. Such information was required to supplement and extend data from previous surface and sub-surface tests, both nuclear and high explosive, and to test and improve prediction methods developed from these data. It is estimated that 9.16 x 1,000,000 pounds of soil, which comprises 3.6 percent of the total crater material, and 2.9 x 10 to the 22nd power fissions, which comprises 17 percent of the fission yield for the Shot were deposited in the sampled area. Adequate data were obtained to show the variation in mass and radioactivity with distance in all directions from surface zero. Graphs of different types depicting these variations are presented; field gamma-flux values obtained by the project are included for comparison. Estimates of variance were determined separately for the mass and gamma activity data. A common value of ± 30 percent obtained for the standard deviations was attributed to the sampling procedure, which was identical for the two sets of data.

AD-617 180 Div. 20/2, 2/5
CFSTI Prices: HC$5.60 MF$0.50

Naval Radiological Defense Lab., San Francisco, Calif.
NEUTRON-INDUCED RADIOACTIVE ISOTOPES IN SOILS,
by R. F. Johnson, C. S. Cook, L. A. Webb, and R. L. Mather. 7 Aug 58, 52p
Proj. 2 3a
WT 1117 Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Soils, Radiological contamination), (*Radiological contamination, Soils), (*Neutron reactions, Soils), Nuclear explosions, Fission products, Radioactive fallout, Radioactive isotopes, Gamma rays, Radioation measurement systems.

This report is concerned with the activities induced in the surface of the earth near ground zero by neutrons released from a nuclear detonation. Gamma-ray spectral measurements of Nevada Test Site soil obtained from the vicinity of ground zero following Shots 1, 4, and 7 have been studied. From these it is concluded that the relative quantities of observed neutron-induced activity to fission-fallout activity are functions of height, yield, and type of detonation. Ten different soil samples were exposed to the neutrons from Shot 5. While only Na24 and Mn56 activities could be definitely found in sifnificant quantities in all soils, the relative amounts of these two radio-isotopes varied over a considerable range and, within reasonable accuracy, can be said to have been activated in proportion to the amount of sodium and manganese atoms present in the soil at the time of irradiation. (Author)

AD-617 181 Div. 20/2
CFSTI Prices: HC$9.60 MF$1.00

Stanford Research Inst., Menlo Park, Calif.
UNDERGROUND EXPLOSION EFFECTS,
by D. C. Sachs and L. M. Swift. 3 Mar 58, 116p
Proj. 1 7
WT 1106
Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Underground explosions, Nuclear explosions), (*Nuclear explosions, Underground explosions), Explosion effects, Underground structures, Soil mechanics, Seismology.

Project 1.7 of Operation TEAPOT was concerned with the measurement of surface and subsurface effects of an underground explosion of a 1.2-kt nuclear burst (Shot 7). The measurements included free-field earth and air-blast effects, as well as loading on underground structural devices. This report deals with the presentation and analysis of the free-field data only; the structural data have been transmitted to the appropriate agencies for their analysis. From the 76 channels installed on TEAPOT Shot 7, 75 usable records were obtained. The free-field quantities measured include air-blast pressure, earth acceleration, earth stress and strain, and permanent earth displacement. The results are discussed by phenomenon and, in each case, the TEAPOT data are compared with pretest predictions. Also, where data are available, comparisons are made with previous underground nuclear test results. Some aspects of seismology and soil mechanics as applied to underground explosion phenomena are presented and, finally, the most pertinent high explosives results from subsequent tests conducted at the TEAPOT location are summarized. (Author)

AD-617 182 Div. 20/2, 9/1
CFSTI Prices: HC$13.00 MF$1.25

Stanford Research Inst., Menlo Park, Calif.
AIRBLAST OVERPRESSURE AND DYNAMIC PRESSURE OVER VARIOUS SURFACES,
by D. C. Sachs, L. M. Swift, and F. M. Sauer.
9 Sep 57, 192p
Proj. 1 10
WT 1109

Unclassified report

Rept. on Operation Teapot, Nevada Test Site, Feb-May 55.

Descriptors: (*Airburst, Nuclear explosions), (*Nuclear explosions, Airburst), (*Fluid mechanics, Nuclear explosions), Explosion effects, Terrain, Atmosphere, Nuclear explosion damage.

Static overpressure and dynamic pressure versus time were measured over surfaces possessing different physical properties on two tower shots, 6 and 12. On shot 12, three surfaces were provided: the natural desert, a water surface consisting of a flooded area, and an asphalt surface. On Shot 6, desert and asphalt areas only were available. There were 123 channels of instrumentation installed for Shot 12, and 24 for Shot 6. The data show the effect of the nature of the surface upon airblast phenomena from a nuclear explosion. Although the indication is that the Shot 12 water line did not provide entirely ideal conditions over its whole length, the measured disturbances were markedly less than those observed on the desert line. The results from the asphalt line show most severe deviation from classical behavior. The effects of surface conditions upon shock phenomena are made more understandable by a review of temperature computations, using shock wave parameters in addition to an analysis based upon the arrival time of the thermal pulse. A phenomenological discussion of precursor formation is presented, and comparisons are made using data from all known precursor-forming nuclear shots.

AD-617 184 Div. 25/4, 25/6
CFSTI Prices: HC$2.00 MF$0.50

Bell Telephone Labs., Inc., Murray Hill, N. J.
SOLID-STATE MASER RESEARCH (OPTICAL).
Quarterly rept. no. 6, 14 Nov 64-14 Feb 65,
by J. E. Geusic, M. L. Hensel, R. G. Smith, and J. A. Koningstein. 14 Feb 65, 28p
Contract DA36 039AMC02333E,
Proj. 1P6 22001A056

Unclassified report

Descriptors: (*Lasers, Solid state physics), Yttrium, Aluminum, Gallium, Neodymium, Pumping(Electronics), Ytterbium, Garnet, Crystals, Field theory, Masers.

The generation is reported of repetitive, high-power pulses by repeated Q-switching of a continuously pumped YAlG:Nd laser. The results are discussed of an experimental and theoretical study of Yb(3+) in Yttrium Aluminum and Yttrium Gallium Garnet. (Author)

AD-617 186 Div. 25/3, 4/4
CFSTI Prices: HC$2.00 MF$0.50

Brown Univ., Providence, R. I. Div. of Engineering.
ASYMPTOTIC THEORY OF A PHOTOIONIZATION CHAMBER: I,
by Ira M. Cohen. Apr 65, 41p Rept. no. 9
Contract Nonr562 35, Proj. NR061 132

Unclassified report

Descriptors: (*Photochemistry, Gas ionization), (*Ionization chambers, Theory), (*Plasma sheath, Ionization chambers), Series, Charged particles, Electric fields, Diffusion, Probes(Electromagnetic), Space charges.

A photoionization chamber consists of two parallel plates between which a test gas is photoionized. The charged particles thus produced then diffuse to the plates where they recombine. This process is analyzed in detail when the fraction of ionization is very low and the mean free path for charged-neutral encounters is very small compared to the chamber width. Particular attention is paid to the physically important limit of sufficiently large charged particle densities to make the Debye length small compared with any macroscopic dimension. In this limit the plasma is quasineutral in the body of the chamber. Near the walls, however, quasineutrality breaks down and a new scaling of the variables is necessary to account for the changed orders of magnitude of the properties in the sheaths. The sheath equations are reduced to one previously solved by the same author. The sheath solution and quasineutral plasma solution are asymptotically matched in their region of common validity. Thus charged particle and electric field distributions are found and typical curves are given. From the tabulated data, current-voltage characteristics of the photoionization chamber may be constructed. Three sample characteristics are given with a little discussion of their interpretation. (Author)

AD-617 197 Div. 25/6
CFSTI Prices: HC$4.00 MF$1.00

Lockheed Missiles and Space Co., Sunnyvale, Calif.
STABILITY OF SHELLS OF REVOLUTION: GENERAL THEORY AND APPLICATION TO THE TORUS.
Doctoral thesis,
by W. Flugge and L. H. Sobel. Mar 65, 149p
Rept. no. 6-75-65-12 Unclassified report

Descriptors: (*Elastic shells, Stability), (*Bodies of revolution, Elastic shells), Buckling(Mechanics), Loading(Mechanics), Stresses, Strain(Mechanics), Vibration, Nonlinear differential equations, Cylindrical bodies, Spheres.

Contents: The elastic law; Equations of equilibrium; Shells of revolution under axially symmetric loads; Toroidal shell under external pressure-theoretical analysis; Toroidal shell under external pressure-numerical results; Free vibrations of prestressed shells of revolution.

AD-617 199 Div. 25/6

California Univ., San Diego. Dept. of Physics.
SUPERCONDUCTIVITY OF TELLURIUM,
by B. T. Matthias and J. L. Olsen. 9 Nov 64, 4p
Grant AF AFOSR344 62, Proj. 9763, Task 976302
AFOSR 65-0805
Unclassified report

Pub. in Physics Letters v13 n3 p202-3 Dec 1 1964 (Copies available only to DDC users).

Descriptors: (*Tellurium, Superconductivity), (*Superconductivity, Tellurium), Transition temperature, Phase studies, Inductance, High pressure research, Cryogenics.

A superconducting transition in tellurium under high pressure at approx 3.3K was observed. This is the first superconductivity noted in the 6th column of the periodic table. This observation supports the view that superconductivity is a general phenomenon. (Author)

AD-617 206 Div. 25/4

California Univ., Los Angeles.
THE PHONON MASER,
by R. Orbach. 15 Feb 65, 4p
Unclassified report

Pub. in Physics Letters v15 n1 p43-45 Mar 1 1965. (Copies available only to DDC users).

Descriptors: (*Phonons, Masers), (*Masers, Phonons), Pumping(Electronics), Theory, Mathematical analysis, Atomic energy levels, Excitation.

The report is a proposal for a c.w., continuously tunable, phonon maser. The mechanism is quite analogous to optical pumping schemes, utilizing a double pump to preferentially populate an excited state of a paramagnetic ion.

AD-617 209 Div. 25/2

Pennsylvania Univ., Philadelphia. Lab. for Research on the Structure of Matter.
Sc SUB 5 Ga SUB 3 AND Y SUB 5 Ga 3 WITH D8 SUB 8 STRUCTURE,
by O. Schob and E. Parthe. 6 Mar 64, 5p
Contract AF49 638 1027, Proj. 9761, Task 976102
AFOSR 65-0770
Unclassified report

Pub. in Acta Crystallographica v17 pt10 Oct 1964 (Copies available only to DDC users).

Descriptors: (*Crystal structure, Metallic crystals), Crystal lattices, Scandium, Gallium alloys, Yttrium, X-ray diffraction analysis, Intermetallic compounds, Crystal structure, Germanium alloys.

The phases Sc5Ga3 and Y5Ga3 were synthesized in an investigation of the occurrence of compounds with D8 sub 8 structure. Induction melting of the metals mixed in proper weight proportions in a boron nitride crucible under argon produced homogeneous samples of Se5Ga3 and Y5Ga3. (Author)

AD-617 210 Div. 20/2, 15/1

Palmer Physical Lab., Princeton Univ., N. J.
AMPLITUDE BOUND IN LADDER GRAPH MODELS. II,
by George Tiktopoulos and S. B. Treiman.
2 Jul 64, 7p
Contract AF49 638 1333, Proj. 9751, Task 975101
AFOSR 65-0843
Unclassified report

Pub. in Physical Review v136 n4B pB1217-20 Nov 23 1964 (Copies available only to DDC users).

Descriptors: (*Nuclear scattering, Mathematical(Models), Integrals, Iterative methods, Graphics, Nuclear spins.

A procedure described earlier for bounding ladder-graph scattering amplitudes is applied here to two models: exchange of pairs of scalar particles (bubbles), and exchange of vector particles. The forward-scattering absorptive amplitudes are bounded from above. Apart from logarithmic factors, the correct amplitudes are known to grow with energy like S alpha, and our results determine upper bounds on the exponents alpha. For case where the exchanged particles are massless, our upper bounds in fact coincide with the exact results for alpha as given in the literature. (Author)

AD-617 211 Div. 25/2

Battelle Memorial Inst., Columbus, Ohio.
ON THE HIGH-PRESSURE FORM OF FeVO4,
by F. Laves, A. P. Young, and C. M. Schwartz.
15 May 64, 4p
Contract AF49 638 441, Proj. 9763, Task 976302
AFOSR 65-0766
Unclassified report

Pub. in Acta Crystallographica v17 pt11 p1476 Nov 1964 (Copies available only to DDC users).

Descriptors: (*Iron compounds, Vanadates), (*Vanadates, Crystal structure), (*Crystal structure, High-pressure research), Phase studies, Oxides.

Evidence is presented that the atomic arrangement of high-pressure FeVO4 is similar to that of ambient-pressure FeNbO4. Evidence is presented in the form of comparing the indexing of high-pressure FeVO4 and the disordered wolframite FeNbO4, which indicates that FeVO4 crystallizes in the disordered wolframite type and that therefore vanadium would have in FeVO4 the coordination number 6. (Author)

AD-617 217 Div. 25/2

Oklahoma State Univ., Stillwater.
FLUX GROWTH OF STANNIC OXIDE CRYSTALS,
by H. F. Kunkle and E. E. Kohnke. 7 Aug 64, 1p
Contract Nonr259501
Unclassified report

Pub. in Journal of Applied Physics v36 n4 p1489 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Crystal growth, Tin compounds), (*Tin compounds, Oxides), Single crystals, Crystal structure.

AD-617 219 Div. 25/4

Columbia Radiation Lab., New York.
STABILITY CONSIDERATIONS FOR A Rb87 MASER OSCILLATOR.
Technical rept.,
by P. Davidovits and R. Novick. 1964, 7p
Rept. no. TR-2
Contracts Nonr425910, DA36 039SC90789,
Proj. NR373 250

Unclassified report

Pub. in IEEE International Convention Record, Pt. 5 p2-6 1965(Copies available only to DDC users).

Descriptors: (*Masers, Oscillators), (*Oscillators, Stability), (*Rubidium, Masers), Atomic clocks, Pumping(Electronics).

Self-sustained oscillation was obtained in an optically pumped rubidium maser operating at the Rb87 hyperfine transition frequency of 6835 Mc/sec. The entire apparatus can be mounted within the volume of one cubic foot. The operating temperature is 60C, and the overall power consumption is only a few watts. The anticipated long-term stability is one part in 10 to the 12th power. Preliminary estimates also indicate that the device has far better short-term stability than any other existing frequency standard. The present paper explains the basic principles of the rubidium maser and examines the factors affecting the stability of oscillation. (Author)

AD-617 221 Div. 25/3

New York Univ., School of Engineering and Science.
MEASUREMENTS OF THE ELECTRIC POLARIZABILITIES OF THE ALKALIS USING THE E-H GRADIENT BALANCE METHOD.
Technical rept.,
by Arthur Salop, Edward Pollack, and Benjamin Bederson. 12 Jun 61, 9p Rept. no. TR-6
Contract Nonr28515

Unclassified report

Pub. in Physical Review v124 n5 p1431-8 Dec 1 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Alkali metals, Polarization), (*Electrical properties, Alkali metals), Electric fields, Magnetic fields, Cesium, Rubidium, Potassium, Sodium, Lithium.

The atomic beam E-H gradient balance method has been used to measure the polarizabilities of the alkali atoms. In this method, congruent electric and magnetic fields are established in the same region of space by applying a potential difference to pole pieces of high permeability which are insulated from their magnet yoke. The determination of the atomic polarizability, a, is therefore independent of the velocity distribution in the beam, the field gradients and the apparatus geometry (except where it enters into the calculation of the electric field). The magnetic field H is readily measured by making use of the convenient alkali zero moments. In these experiments, absolute accuracy for the a's is limited by the uncertainty in the determination of E, which is calculated from a knowledge of the applied voltage and the gap geometry. The results in units of 10 to the -24th power cc are: Li, 20±3.0; Na, 20±2.5; K, 36.5±4.5; Rb, 40±5.0; Cs, 52.5±6.5. These are considerably higher than the values obtained in early beam experiments using electrostatic deflection techniques. They are, however, in fairly good agreement with the recent calculations of Dalgarno and Kingston and with other theoretical determinations of alkali polarizabilities. (Author)

21. Propulsion and Fuels

AD-616 590 Div. 10/5, 10/6, 32/3
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
THE RUSSIAN LITERATURE ON ROCKET PROPELLANTS,
by F. J. Krieger. 25 Mar 60, 25p
Rept. no. P-1954

Unclassified report

Rept. prepared for presentation at the National Meeting of the American Chemical Society (137th), Cleveland, Ohio, 8 Apr 60.

Descriptors: (*Rocket propellants, Reviews), (*USSR, Rocket propellants), (*Periodicals, Rocket propellants), Reports, Bibliographies, Solid rocket propellants, Liquid rocket propellants, Pentaboranes, Ammonium compounds, Nitrates, Hydrogen peroxide, Free radicals, Ozone, Documentation.

Because of their emphasis on science and technology, the Soviets bring to light the results of their scientific investigations in a wide variety of controlled publications. These include the popular press, as well as a multiplicity of scientific and industrial journals. Although the Soviets publish widely on combustion, detonation, explosion, and industrial explosives, their output of original material on rocket propellants is seriously limited by security restrictions. Nevertheless, examination of the Russian literature reveals (1) a thorough familiarity with Western developments, and (2) considerable research activity on both solid and liquid propellants of the conventional and nonconventional variety. Among the objects of special interest are pentaborane, ammonium nitrate, ozone, hydrogen superoxide, and frozen radicals. (Author)

AD-616 648 Div. 10/2, 16/4
CFSTI Prices: HC$2.00 MF$0.50

Systems Research Labs., Inc., Dayton, Ohio.
MICROBIAL ACTIVITY IN AIR FORCE JET FUEL SYSTEMS.
Final rept. for Feb 63-Apr 64,
by Viola H. Finefrock, Lawrence N. Killian, and Sheldon A. London. Apr 65, 31p
Contract AF33 657 11733, Projs. 3048, 101A
AMRL TR-65-30

Unclassified report

Descriptors: (*Fuel contamination, Microorganisms), (*Jet engine fuels, Contamination), (*Microorganisms, Jet engine fuels), (*Corrosion, Fuel tanks), Bacteria, Fungi, Corrosion inhibition, Hydrocarbons, Separation, Degradation, Fuel systems, Aluminum alloys, Fungus deterioration, De-icing materials, Fuel additives.

Malfunctions and changes occurring in JP-4 fuel systems have been attributed to the presence of microorganisms. The known capability of microbial entities to utilize hydrocarbon products as a carbon source has been considered as a priori evidence of a direct cause-effect relationship in the deterioration of jet fuel systems. The direct implication of microbes in the deterioration of Air Force jet fuel systems has not been proved unequivocally. The U.S. Air Force, as well as the Navy and Army, have instituted research programs to determine the specific changes caused by bacterial and fungal growth in JP-4 and the contributory factors which promote or retard their activities. The presence of contaminating microbes was shown to occur only in association with free water. Microbial corrosion of various aluminum alloys has been demonstrated in the laboratory, but poor reproducibility attests to the lack of understanding of this phenomenon. The efficacy of the anti-icing additive, ethylene glycol monomethyl ether (EGME), as a microbial inhibitor has been well documented. Although a low level of viable microorganisms continues to be observed in Air Force fuel systems, the application of good housekeeping and the effect of EGME appear to have controlled their activity. (Author)

AD-616 771 Div. 27/3, 7/1
CFSTI Prices: HC$1.00 MF$0.50

General Electric Co., Philadelphia, Pa. Missile and Space Div.
LIFE TESTS ON CAPACITORS FOR PULSED PLASMA ENGINE APPLICATIONS.
Technical information series,
by Bernard Gorowitz and Thomas W. Karras.
Jun 65, 15p Rept. no. R65SD26

Unclassified report

Descriptors: (*Capacitors, Plasma engines), (*Plasma engines, Capacitors), Life expectancy, Tests, Failure(Mechanics), Reliability(Electronics), Performance(Engineering), Weight, Power, Circuits.

A description is given of tests conducted with some off the shelf energy storage capacitors for the purpose of investigating life, failure modes and weight to power ratios. Up to 6.4 x 10 to the 7th power shots were obtained with a given unit. Suggestions for the improvement of capacitor reliability and weight to power ratio are presented. (Author)

AD-616 888 Div. 10/6, 1/5, 1/6

Frankford Arsenal, Philadelphia, Pa.
SOLID PROPELLANT COOL GAS GENERATOR,
by Thomas Q. Ciccone and James F. Kowalick.
Jun 65, 14p Rept. no. A65-3

Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Inflatable structures, Gases), (*Gas generator systems, Cooling), (*Solid propellants, Gas generator systems), Damage, Heat exchangers, Chemicals.

One of the major problems encountered in inflatable devices has been the degradative effect of high-temperature propellant gas on materials, resulting in rupture and/or burning of fabric structures. This problem has been eliminated through the use of a packed-bed chemical heat exchanger, thereby reducing effluent gas temperature to an acceptable level. A method is described for producing rapid and efficient cooling by this technique, such that the temperature of the cooled gases is essentially independent of both flame temperature and ambient temperature. The method involves passing the high-temperature gas through bulk arrangements of chemicals which decompose endothermically and produce further gases that mix with the propellant gases. The resultant mixture has increased mass and a greatly reduced temperature. Advances in chemical coolant-heat exchanger technology as related to propellant gas-generating systems are described. In particular, design data for specific propellant-coolant systems are discussed, with emphasis on their use for inflatable devices.

AD-616 916 Div. 27/3
CFSTI Prices: HC$11.00 MF$3.25

Foreign Technology Div., Wright-Patterson AFB, Ohio.
LIQUID-FUEL ROCKET ENGINES THEORY AND DESIGNING,
by G. B. Sinyarev and M. V. Dobrovolskii.
Mar 60, 803p F-TS-9741
TT 60-19108;TT 60-19109
Unclassified report

Trans. of mono. Zhidkostnye Raketnye Dvigateli Teoriya i Proektirovanie, Moscow, 1957.

Descriptors: (*Rocket motors(Liquid propellant), Design), Theory, USSR, Thrust, Combustion.

This book explains the principles of the theory of liquid-fuel rocket engines and the methods of designing their basic parts and assemblies. It gives the necessary data for calculation of the thrust and determination of the basic dimensions of all the components and assemblies of liquid-fuel rocket engines. Examples illustrating the application of the methods of calculation are given. (Author)

AD-616 985 Div. 10/2, 4/3
CFSTI Prices: HC$0.75 MF$0.50

Naval Research Lab., Washington, D. C.
FLAMMABILITY PROPERTIES OF HYDROCARBON FUELS. PART I. INTERRELATIONS OF FLAMMABILITY PROPERTIES OF n-ALKANES IN AIR.
Interim rept.,
by W. A. Affens. 25 May 65, 25p
Rept. no. NRL-6270
Projs. SR001 06 02 0600, RR010 01 44 5850
Unclassified report

Descriptors: (*Jet engine fuels, Flammability), (*Aliphatic compounds, Flammability), (*Flammability, Jet engine fuels), Combustion, Vapor pressure, Molecular weight, Hydrocarbons.

By a systematic study of literature data, mathematical equations have been derived which describe the interrelationships of flammability and other related properties of the n-alkanes. The properties which have been correlated are: lower and upper flammability limits, flash point, vapor pressure (at the flash point), flammability index (explorsiveness), boiling point, stoichiometric concentration, heat of combustion, molecular weight, and carbon number. Good agreement was found between average literature data and values calculated by the derived equations. From a given flammability property, by use of the derived equations, it is possible to predict the other properties, as well as the relative magnitudes of changes in these properties as a result of a change in the given property. (Author)

AD-617 191 Div. 10/2, 10/5
CFSTI Prices: HC$4.00 MF$1.00

Phillips Petroleum Co., Bartlesville, Okla.
HIGH PRESSURE COMBUSTOR STUDIES OF FLAME RADIATION AS RELATED TO HYDROCARBON STRUCTURE.
Progress rept. no. 3,
by R. M. Schirmer and H. T. Quigg. 20 May 65,
118p Rept. no. 3952-65R
Contract NOw64 0443d
Unclassified report

See also AD-610 196.

Descriptors: (*Jet engine fuels, Combustion), (*Hydrocarbons, Combustion), (*Combustion, Molecular structure), Flames, Thermal radiation, Aromatic compounds, Combustion chambers, Pressure, Flames, Blackbody radiation, Heat transfer, Hydrogen.

Measurements were made of the total radiant energy from flames of 25 different fuels in a combustor operating at 22 different conditions. The test fuels consisted of a series of pure hydrocarbons, varying widely in molecular structure and boiling point, and a group of JP-5 fuels, blended to rigidly control hydrocarbon type and aromatic structure. This study was conducted using the Phillips 2-inch diameter research combustor, which simulates conditions for combustion in an aviation turbine engine. In general, flame radiation increased with increasing combustor pressure, inlet air temperature and heat input rate, and decreased with increasing flow velocity. However, the magnitude of these effects differed with both hydrocarbon structure and operating conditions. A satisfactory relationship was established between flame radiation and fuel hydrogen content, for a given operating condition. However, the relationship between fuel hydrogen content and flame radiation varied with operating conditions; therefore, an overall relationship was not developed. The relationship between fuel hydrogen content and fuel Luminometer Number is poor.

22. Space Technology

AD-616 503 Div. 12/6
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
MAIN STREET, THE MOON, AND WHAT NEXT,
by H. P. Lynn, Jr. 7 Dec 59, 25p
Rept. no. P-1878
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Space flight, Astronautics), Space propulsion, Spacecraft, Space probes, Guidance, Space navigation, Scientific research.

A discussion is presented of the following questions: How do we stand technically in our space programs. Why are we involved in space programs, anyway.

AD-616 508 Div. 12/6, 12/1

RAND Corp., Santa Monica, Calif.
ATMOSPHERIC ENTRY OF MANNED VEHICLES,
by Carl Gazley, Jr. 20 Jan 60, 41p
Rept. no. P-1890
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Atmosphere entry, Manned spacecraft), (*Manned spacecraft, Atmosphere entry), Feasibility studies, Recovery vehicles, Orbital trajectories, Deceleration, Aerodynamic heating, Ablation, Blunt bodies, Lift, Drag, Thermal radiation, Aerodynamic characteristics, Mathematical analysis.

The establishment of manned space stations requires the development of a reliable system for manned return to the Earth. The requirements of such a system are reviewed and compared with the characteristics of various atmospheric penetration techniques. While human deceleration limitations require the relatively low decelerations of gradual atmospheric entry (i.e., shallow path), the aerodynamic shaping of the vehicle and the method of surface heat absorption (or rejection) can conceivably cover a wide range of feasible possibilities. This paper discusses problems of orbital departure and the establishment of the initial entry path, the dynamics of deceleration during entry, the aerodynamic heating of the vehicle surface, and the characteristics of various types of surface-protection systems. It is concluded that there are two types of feasible vehicles for manned entry: (1) a blunt dense vehicle with little or no aerodynamic lift and a low-temperature ablation-cooling system; and (2) a radiation-cooled vehicle using a very light drag brake or lifting surface to achieve high-altitude deceleration. (Author)

AD-616 525 Div. 12/6, 12/1
CFSTI Prices: HC$3.00 MF$0.75

Frankford Arsenal, Philadelphia, Pa.
DYNA-SOAR ESCAPE SYSTEM PROPELLANT ACTUATED DEVICES,
by Raymond C. Sutter. May 65, 68p
Rept. no. R-1757
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Cartridges(Pad), Boost-glide vehicles), (*Boost-glide vehicles, Cartridges(Pad)), (*Ejection seats, Boost-glide vehicles), Safety devices, Catapults, Explosives initiators, Acceleration, Manned spacecraft, Vibration, Quality control, Test methods, Performance-(Engineering), Tables.

Propellant actuated devices, originally developed for use in conventional aircraft, were subjected to special vibration tests in order to qualify them for use in the Dyna-Soar (X20) Escape System. Four initiators were developed for use in the system and the ejection seat catapult was tested under high g loads to determine safety of the defice if initiated during high down-load conditions. (Author)

AD-616 572 Div. 12/6, 12/2, 15/1
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
APPLICATIONS OF DYNAMIC PROGRAMMING TO SPACE GUIDANCE, SATELLITES, AND TRAJECTORIES. Revised ed.,
by Richard Bellman, Stuart Dreyfus, and Robert Kalaba.
7 Feb 61, 11p Rept. no. P-1923
Unclassified report

Revision of manuscript submitted 26 Feb 60.
Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Orbital trajectories, Spacecraft), (*Optimization, Orbital trajectories), (*Dynamic programming, Space flight), Guidance, Satellites-(Artificial), Trajectories, Calculus of variations.

The feasibility of space travel and man-made satellites has triggered a rash of interest in the determination of optimal trajectories and generally in guidance and control processes. These problems, for so long of purely mathematical and astronomical concern, have now become part of the engineering domain. The result is that there is a great demand for feasible numerical solutions of the associated analytic problems. Many of these are classically of great difficulty. As a result of the intensive study of these questions, it is now well appreciated that the classical techniques of the calculus of variations are inoperative unless the problem is rather carefully selected. The applicability is shown of a new mathematical technique, based on the theory of dynamic programming, to the computational solution of trajectory problems. Many problems, seemingly inaccessible to the conventional methods of the calculus of variations, have already been resolved. (Author)

AD-616 595 Div. 12/6, 12/1

RAND Corp., Santa Monica, Calif.
METEOROIDS VERSUS SPACE VEHICLES,
by R. L. Bjork. 4 Apr 60, 21p Rept. no. P-1963
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Spacecraft, Meteors), (*Meteors, Hazards), Design, Space environmental conditions, Impact shock, Weight, Radiators, Space stations, Density, Measurement, Penetration.

The preliminary designs of space power station radiators, as well as the simple examples given herein indicate that the weight penalty imposed by present best estimates of the meteoroid hazard is large enough to warrant considerable research aimed toward its reduction. The estimates given in this paper have purposely been kept conservative where uncertainties were felt to exist, and in this sense represent the design criteria forced upon the present-day designer. The analysis focuses attention on several promising areas where research might hopefully lead to lighter weight designs. (Author)

AD-616 627 Div. 12/6, 12/1, 24/2, 30/5
CFSTI Prices: HC$7.00 MF$1.75

New Mexico Univ., Albuquerque.
THE OBSERVATION AND COMPUTATION OF REENTRY TRAJECTORIES WITH THE AIRBORNE ASTROGRAPHIC CAMERA SYSTEM.
Rept. for Jan 63-Sep 64,
by James D. Wray. Apr 65, 308p
Contract AF29 601 6284, Proj. 627A000
SWC TR-64-6

Unclassified report

Descriptors: (*Trajectories, Atmosphere entry), (*Aerial photography, Descent trajectories), Theory, Determination, Airborne, Aerial cameras, High-speed cameras, Tracking cameras, Data, Programming-(Computers), Data processing systems, Errors, Programming languages.

A detailed theory is presented for computation of reentry trajectories. The theory is intended for application to an airborne range facility consisting of two aircraft. Such a facility, the Airborne Astrographic Camera System, is described, as are the fundamental principles of data acquisition by this system. The observational techniques developed for the system permit the recording of stars of photographic magnitude +6.5 with exposure times of 0.2 second. Techniques for rapid identification of comparison stars are presented. A modified 12-constant plate reduction theory is employed with excellent results in airborne applications. A complete data-reduction flow diagram covering film processing and measurement to final data product is presented, as are the detailed FORTRAN computer programs developed for the reduction and analysis of all spatial reentry trajectory data gathered by the system. (Author)

AD-616 643 Div. 12/6, 12/1, 16/1
CFSTI Prices: HC$2.00 MF$0.50

Frost Engineering Development Corp., Denver, Colo.
RESPONSE OF A LINEAR DAMPED DYNAMIC SYSTEM TO SELECTED ACCELERATION INPUTS.
Final rept. for Apr-Jun 63,
by Stanley Barrett and Peter R. Payne. Apr 65, 47p
Technical rept. no. TR-194-10
Contract AF33 657 9514, Proj. 6301, Task 630102
AMRL TR-65-40

Unclassified report

Descriptors: (*Acceleration, Damping), (*Damping, Dynamics), Mathematical analysis, Shock(Mechanics), Reentry vehicles, Acceleration tolerance, Humans, Integral transforms, Series, Biophysics.

The general theory is developed for the response of a single degree of freedom dynamic system to an arbitrary acceleration forcing function. Closed-form solutions are obtained for a variety of discrete pulse shapes using the method of Laplace transforms and the form of the solutions indicated for oscillatory inputs and semi-infinite ramps, in terms of complex Fourier series. A comparison of base and mass excitation of the system is included. In previously published work on this subject, analytical solutions are in general only given for undamped systems; an exception is the response to a sine-wave, which appears in many standard tests. The dynamic analysis of the human body usually considers models involving damping, so that in this area there is a definite need for the estensions given. (Author)

AD-616 699 Div. 12/6, 12/1
CFSTI Prices: HC$1.00 MF$0.50

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
APPLICATION OF GAS EXPANSION TO FLUID CIRCULATION DEVICES IN MANNED SPACE ASSEMBLIES.
Final rept. for Jun-Aug 64,
by D. A. Keating. Apr 65, 17p AMRL TR-65-26
Proj. 6373, Task 637302Unclassified report

Descriptors: (*Life support, Manned spacecraft), (*Manned spacecraft, Gases), (*Gases, Fluid flow), (*Power supplies, Manned spacecraft), Closed ecological systems, Respiration, Barometric pressure, Entropy, Weight, Oxygen, Nitrogen, Air, Incompressible flow, Statistical distributions, Batteries + components, Graphics.

The power required to circulate fluids for various pressure drops and flow rates, and the power obtained from isentropic expansion of habitable gases for manned space assembly application have been investigated. The results demonstrate the feasibility of using habitable gases, stored under pressure, as potential energy sources to power fluid circulation devices. These findings indicate that significant weight savings can be obtained using the gas expansion technique to furnish the required power of fluid circulation as compared to using other power sources, such as batteries. (Author)

AD-616 790 Div. 12/6, 12/2
CFSTI Prices: HC$3.00 MF$0.75

Grumman Aircraft Engineering Corp., Bethpage N. Y.
ON NONLINEAR OPTIMAL CONTROL PROBLEMS WITH CONTROL APPEARING LINEARLY.
Doctoral thesis,
by Herman Munick. Jun 65, 80p
Contract AF49 638 1207

Unclassified report

Thesis presented to the Faculty of the Dept. of Graduate Mathematics, Adelphi Univ., Garden City, N. Y.

Descriptors: (*Optimization, Control), (*Thrust vector control systems, Optimization), Calculus of variations, Transformations(Mathematics), Rocket trajectories, Thrust, Fuel consumption.

In a classical paper of 1919, Goddard posed the problem of finding the thrust program so that a specified payload is delivered in vertical flight to a desired altitude with least fuel expenditure. This and other control problems are considered in this thesis. Pontryagin's maximum principle, a necessary condition, is the primary tool employed. For Goddard's problem and other control problems considered, the control appears linearly in the system of equations. This permits the introduction of a switching function that can be used to give a decomposition of the optimal control into subarcs. A more natural way to decompose the optimal control is into subarcs for

which either the control assumes boundary points or interior points of the control region. According to the former method, subarcs are called S-subarcs and according to the latter method, T-subarcs.

AD-617 167 Div. 12/6, 12/1
CFSTI Prices: HC$2.00 MF$0.50

Aeronautical Chart and Information Center, Saint Louis, Mo.
THE OSCULATING H-FRAME: A NEW ANALYTICAL TECHNIQUE IN ORBITAL DYNAMICS.
Technical paper,
by James A. Jungmann. Apr 65, 49p
Rept. no. ACIC-TP-17

Unclassified report

Descriptors: (*Vector analysis, Orbital trajectories), (*Orbital trajectories, Vector analysis), Dynamics, Perturbation theory, Interplanetary trajectories, Center of mass, Spacecraft.

The three-degree-of-freedom (point mass) equations of motion for a space vehicle with respect to a gravitating mass are derived first in terms of the H-Frame. The derivation is effected by using the expression for the velocity of the vehicle in planet-centered or heliocentric 'inertial' Cartesian coordinates (in this connotation the system is fixed in space and non-rotating) and the velocity determined in terms of spherical coordinates. Utilizing Lagrange's variation of parameters method, the rates of change of the H-Frame-referenced orbital elements are determined as functions of the perturbation forces (forces other than central gravitational). The technique is then applied to three specific problems wherein the intrinsic advantages become more apparent--the motion of a vehicle in earth orbit, a cislunar trajectory, and the low-thrust powered flight of an interplanetary spacecraft.

How To Use Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and division number. A typical subject index entry is shown below.

*COMBUSTION
OSCILLATION
INTENTIONAL COMBUSTION
OSCILLATIONS IN PROPULSION
SYSTEMS
AD-608 206 DIV. 25

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Division numbers and titles are also listed. Again, three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*BENDAT, JULIUS S.
* * *
ZERO CROSSINGS OF A SINE
WAVE PLUS RANDOM NOISE
AD-608 019 DIV. 15
* * *
SPECTRA AND AUTOCORRELATION
FUNCTIONS FOR FULLY DEVELOPED
SEAS AND PREDICTION OF STRUCTURAL
FATIGUE DAMAGE
AD-608 464 DIV. 2

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown on the next page.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
AD-608 206 DIV. 25

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and division number.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
LL TR 365
(ESD TDR64 378)
AD-608 272 DIV. 30
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(ESD TDR64 566)
AD-608 288 DIV. 8

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AD-617 013 FLD. 1

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AD-616 493 FLD. 20

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(AFOSR 65-0939)
AD-616 614 FLD. 20

•AF AFOSR366 64
INSTITUTE FOR AEROSPACE STUDIES
UNIV OF TORONTO (ONTARIO)
(AFOSR 65-0939)
AD-616 614 FLD. 20

•AF AFOSR418 63
DALLAS SEISMOLOGICAL OBSERVATORY
SOUTHERN METHODIST UNIV
TEX
AD-616 462 FLD. 8

•AF AFOSR800 64
MARYLAND UNIV COLLEGE PARK
(AFOSR 65-0826)
AD-616 467 FLD. 20

•AF AFOSR802 64
MASSACHUSETTS INST OF TECH
CAMBRIDGE
(AFOSR 65-0684)
AD-616 469 FLD. 7

•AF AFOSR819 64
MCMASTER UNIV HAMILTON (ONTARIO)
DEPT OF METALLURGY AND METAL
LURGICAL ENGINEERING
(AFOSR 65-0788)
AD-616 466 FLD. 11

•AF AFOSR57 64
NEW YORK STATE UNIV BROOKLYN
DOWNSTATE MEDICAL CENTER
AD-616 825 FLD. 5

•AF AFOSR608 64
MAINE UNIV ORONO
(AFOSR 65-0789)
AD-616 472 FLD. 7

•AF AFOSR62 268
UTAH STATE UNIV OF AGRICULTURAL
AND APPLIED SCIENCE LOGAN
(AFOSR 65-0678)
AD-616 470 FLD. 7

•AF AFOSR62 280
POLYTECHNIC INST OF BROOKLYN
N Y MICROWAVE RESEARCH INST
(AFOSR 65-0622)
AD-616 464 FLD. 9

•AF AFOSR62 307
NORTHWESTERN UNIV EVANSTON
ILL GAS DYNAMICS LAB
(AFOSR 65-0926)
AD-616 789 FLD. 20

•AF AFOSR62 338
SAO PAULO UNIV (BRAZIL)
AD-616 823 FLD. 6

•AF AFOSR62 421
SEISMOLOGICAL LAB CALIF INST
OF TECH PASADENA
AD-617 039 FLD. 8

•AF AFOSR63 329
NORTHWESTERN UNIV EVANSTON
ILL GAS DYNAMICS LAB
(AFOSR 65-0926)
AD-616 789 FLD. 20

•AF EOAR62 57
TECHNION -ISRAEL INST OF TECH
HAIFA DEPT OF MECHANICS
(AFOSR 3113)
AD-616 456 FLD. 20

•AF EOAR63 88
TECHNION -ISRAEL INST OF TECH
HAIFA DEPT OF AERONAUTICAL
ENGINEERING
AD-617 151 FLD. 20

•AF EOAR63 79
CAMBRIDGE UNIV (ENGLAND)
(AROSR 65-0833)
AD-616 492 FLD. 20
(AFOSR 65-0832)
AD-616 468 FLD. 12

•AF EOAR64 64
UPPSALA UNIV (SWEDEN)
(AFCRL 65-349)
AD-617 121 FLD. 20

•AF EOAR87 63
NATIONAL ELECTROTECHNICAL
INST TURIN (ITALY)
(AFOSR 65-0752)
AD-616 457 FLD. 20

•AF 33 657 8974
BROWN UNIV PROVIDENCE R I
(ARL 65-74)
AD-616 764 FLD. 20

•AF04 694 427
AEROELASTIC AND STRUCTURES
RESEARCH LAB MASS INST OF
TECH CAMBRIDGE
AD-616 739 FLD. 9
AD-616 907 FLD. 13

•AF04 695 469
AEROSPACE CORP EL SEGUNDO
CALIF
(SSD TDR-65-42)
AD-616 885 FLD. 16

•AF08 606 4735
MICHIGAN UNIV ANN ARBOR
INFRARED LAB
(ETR TR-65-8)
F AD-616 676 FLD. 20

•AF19 604 3495
COURANT INST OF MATHEMATICAL
SCIENCES NEW YORK UNIV
N Y
(AFCRL 63-375)
AD-616 827 FLD. 20

•AF19 604 3861
CENTER FOR ATMOSPHERIC AND
SPACE PHYSICS UNIV OF MARYLAND
COLLEGE PARK
(AFCRL 65-368)
F AD-616 926 FLD. 4

•AF19 604 4955
COURANT INST OF MATHEMATICAL
SCIENCES NEW YORK UNIV
N Y
AD-617 015 FLD. 20
AD-617 016 FLD. 20

•AF19 604 5196
HARVARD COLL OBSERVATORY
CAMBRIDGE MASS
(AFCRL 65-33)
F AD-616 792 FLD. 4

•AF19 604 5705
AVIATION PSYCHOLOGY LAB UNIV
OF ILLINOIS URBANA
(ESD TDR-63-125)
AD-616 965 FLD. 5

•AF19 604 6180
GEOPHYSICAL INST UNIV OF ALASKA
COLLEGE
AD-616 475 FLD. 8

•AF19 604 7259
CHICAGO UNIV ILL
(AFCRL 65-220)
F AD-616 910 FLD. 4

•AF19 604 7984
LIGHTNING AND TRANSIENTS RESEAPCH
INST MINNEAPOLIS MINN
L T 417
(AFCRL 64-859 I)
F AD-616 550 FLD. 4

•AF19 604 7992
GEO-SCIENCE INC ALAMOGORDO
N MEX
(AFCRL 65-310)
F AD-617 083 FLD. 4

•AF19 628 200
INSTITUTE OF SCIENCE AND TECH
UNIV OF MICHIGAN ANN ARBOR
(AFCRL 65-406)
F AD-617 122 FLD. 8

•AF19 628 2357
POLYTECHNIC INST OF BROOKLYN
N Y MICROWAVE RESEARCH INST
(AFCRL 65-221)
AD-616 909 FLD. 20

•AF19 628 2390
MITRE CORP BEDFORD MASS
(ESD TDR-64-136)
AD-616 817 FLD. 9
(ESD TR-65-87)
AD-616 678 FLD. 17

•AF19 628 2406 GRANT
CRUFT LAB HARVARD UNIV CAMBRIDGE
MASS
(AFCRL 65-346)
AD-616 911 FLD. 9
(AFCRL 65-336)
AD-616 912 FLD. 9

•AF19 628 249

MCGILL UNIV MONTREAL (QUEBEC)
STORMY WEATHER GROUP
(AFCRL 65-340)
AD-616 625 FLD. 4

•AF19 628 269
MARYLAND UNIV COLLEGE PARK
(AFCRL 65-348)
F AD-617 078 FLD. 20

•AF19 628 2779
GEOPHYSICAL INST UNIV OF ALASKA
COLLEGE
AD-616 475 FLD. 8

•AF19 628 319
RHODE ISLAND UNIV KINGSTON
(AFCRL 65-155)
AD-617 148 FLD. 8

•AF19 628 3837
LINCOLN LAB MASS INST OF TECH
LEXINGTON
AD-616 439 FLD. 20

•AF19 628 3875
NORTHEASTERN UNIV BOSTON
MASS
(AFCRL 65-176)
F AD-617 065 FLD. 4

•AF19 628 3880
AMERICAN METEOROLOGICAL SOCIETY
BOSTON MASS
(TT 65-62504)
AD-616 679 FLD. 12
(TT 65-62507)
AD-616 733 FLD. 20

•AF19 628 3998
NATIONAL CENTER FOR ATMOSPHERIC
RESEARCH BOULDER COLO
(AFCRL 65-313)
F AD-617 060 FLD. 4

•AF19 628 4019
BRANDEIS UNIV WALTHAM MASS
ASTROPHYSICS INST
(AFCRL 65-263)
AD-616 474 FLD. 20

•AF19 628 4047
AMERICAN SCIENCE AND ENGINEERING
INC CAMBRIDGE MASS
(AFCRL 65-337)
F AD-617 142 FLD. 20

•AF19 628 4303
DUNLAP AND ASSOCIATES INC
DARIEN CONN
(ESD TDR-65-216)
F AD-617 082 FLD. 12

•AF19 628 455
BIO-DYNAMICS INC CAMBRIDGE
MASS
(ESD TDR-64-234 V3)
AD-616 544 FLD. 5
(ESD TDR-64-234 V5)
F AD-616 545 FLD. 5
(ESD TDR-64-234 V4)
AD-616 551 FLD. 5

•AF19 628 4766
AIR FORCE CAMBRIDGE RESEARCH
LABS BEDFORD MASS
AD-617 010 FLD. 14

•AF19 628 4910
STANFORD RESEARCH INST MENLO
PARK CALIF
(AFCRL 65-206)
AD-616 637 FLD. 20

•AF19 628 500
GENERAL ELECTRIC CO PHILADELPHIA
PA MISSILE AND SPACE DIV
F AD-616 993 FLD. 16
LINCOLN LAB MASS INST OF TECH
LEXINGTON
(ESD TDR-65-74)
AD-616 528 FLD. 9
(ESD TDR-65-34)
AD-616 607 FLD. 4
(ESD TDR-65-75)
AD-616 677 FLD. 12
(ESD TDR-65-225)
AD-616 986 FLD. 9

•AF29 601 5836
LOUISIANA STATE UNIV BATON
ROUGE DEPT OF ENGINEERING
MECHANICS
(WL TR-64-64)
F AD-617 064 FLD. 20

•AF29 601 6284
NEW MEXICO UNIV ALBUQUERQUE
(SWC TR-64-6)
AD-616 627 FLD. 22

•AF29 601 6976
GENERAL ATOMIC DIV GENERAL
DYNAMICS CORP SAN DIEGO
CALIF
(WL TR-64-180)
F AD-616 518 FLD. 20

•AF30 602 2166
ANTENNA LAB OHIO STATE UNIV
RESEARCH FOUNDATION COLUMBUS
(RADC TR-65-68 V2)
AD-616 532 FLD. 20
(RADC TR-65-68 V3)
AD-616 533 FLD. 20
(RADC TR-65-68 V4)
AD-616 534 FLD. 20
(RADC TR-65-68 V1)
AD-616 535 FLD. 20
(RADC TR-65-66 V1)
AD-617 002 FLD. 17

•AF30 602 2998
MICROWAVE ASSOCIATES INC BURLINGTON
MASS
(RADC TR-65-53)
F AD-616 548 FLD. 9

•AF30 602 3041
SYLVANIA ELECTRONIC SYSTEMS
WILLIAMSVILLE N Y
(RADC TR-65-90)
AD-617 140 FLD. 9

•AF30 602 3263
AUTONETICS ANAHEIM CALIF
(RADC TR-65-25)
F AD-617 087 FLD. 20

•AF30 602 3279
HUGHES AIRCRAFT CO FULLERTON
CALIF
(RADC TR-65-32)
F AD-616 620 FLD. 9

•AF30 602 3290
MOORE SCHOOL OF ELECTRICAL
ENGINEERING UNIV OF PENNSYLVANIA
PHILADELPHIA
(RADC TR-65-43)
AD-617 123 FLD. 9

•AF30 602 3418
GENERAL ELECTRIC CO PHILADELPHIA
PA MISSILE AND SPACE DIV
(RADC TR-65-64)
AD-617 141 FLD. 9

•AF30 602 3496
WESTERN MICROWAVE LABS INC
SANTA CLARA CALIF
F AD-616 554 FLD. 9

•AF33 608 1063
GEORGIA INST OF TECH ATLANTA
AD-617 081 FLD. 5

•AF33 608 1076
KANSAS STATE UNIV MANHATTAN
AD-617 084 FLD. 13
AD-617 085 FLD. 20

•AF33 608 1096
OKLAHOMA UNIV NORMAN
AD-616 712 FLD. 13
AD-616 713 FLD. 1

•AF33 608 1097
OKLAHOMA STATE UNIV STILLWATER
AD-616 723 FLD. 13
AD-616 724 FLD. 13

•AF33 608 1104
PITTSBURGH UNIV PA
AD-617 066 FLD. 20

•AF33 608 1119
TEXAS TECHNOLOGICAL COLL
LUBBOCK SCHOOL OF ENGINEERING
AD-616 722 FLD. 12

•AF33 608 1120
TEXAS A AND M UNIV COLLEGE
STATION
AD-616 714 FLD. 12
AD-616 715 FLD. 12
AD-616 720 FLD. 18

•AF33 608 1134
WYOMING UNIV LARAMIE
AD-617 068 FLD. 14

•AF33 615 1023
MARTIN CO DENVER COLO
(ARL 65-71)
F AD-616 742 FLD. 12

•AF33 615 1043
TULANE UNIV NEW ORLEANS LA
(ARL 65-70)
AD-617 067 FLD. 7

•AF33 615 1112
KOPPERS CO INC MONROEVILLE
PA
(APL TR-65-3)
AD-617 072 FLD. 11

•AF33 615 1235
ELECTRONIC PROPERTIES INFORMATION
CENTER CULVER CITY CALIF
AD-616 783 FLD. 9

•AF33 615 1364
TEXAS INSTRUMENTS INC DALLAS
AD-616 900 FLD. 11

•AF33 615 1951
HUGHES AIRCRAFT CO LOS ANGELES
CALIF MICROWAVE TUBE DIV
AD-616 736 FLD. 9

•AF33 615 2214
BUNKER-RAMO CORP CANOGA PARK
CALIF
F AD-616 765 FLD. 5

•AF33 615 2460
ELECTRONIC PROPERTIES INFORMATION
CENTER CULVER CITY CALIF
AD-616 782 FLD. 9

•AF33 616 2666
IIT RESEARCH INST CHICAGO
ILL
(WT 1124)
AD-617 149 FLD. 20

•AF33 616 7996
NORTH AMERICAN AVIATION INC
COLUMBUS OHIO
(AMRL TR-65-28)
F AD-616 895 FLD. 14

•AF33 616 8160
TEXAS NUCLEAR CORP AUSTIN
(ASD TDR-62-1038 P3 V2)
AD-617 126 FLD. 20

•AF33 616 8240
IIT RESEARCH INST CHICAGO
ILL
(AMRL TR-65-92)
F AD-617 127 FLD. 9

•AF33 616 8256

GENERAL ELECTRIC CO PLEASANTON CALIF SPECIAL PURPOSE NUCLEAR SYSTEMS OPERATION
(AL TDR-64-115)
AD-617 071 FLD. 10

•AF33 616 8269
GENERAL ELECTRIC RESEARCH LAB SCHENECTADY N Y
AD-616 606 FLD. 20

•AF33 657 11041
NUCLIDE CORP STATE COLLEGE PA
(ML TR-65-81)
F AD-616 741 FLD. 20

•AF33 657 11733
SYSTEMS RESEARCH LABS INC DAYTON OHIO
(AMRL TR-65-30)
F AD-616 648 FLD. 21

•AF33 657 9814
FROST ENGINEERING DEVELOPMENT CORP DENVER COLO
(AMRL TR-65-40)
F AD-616 643 FLD. 22
(AMRL TR-65-108)
F AD-616 960 FLD. 6

•AF33 657 9885
NEW YORK STATE UNIV BUFFALO
(ARL 65-75)
AD-616 842 FLD. 12

•AF49 638 1027
PENNSYLVANIA UNIV PHILADELPHIA LAB FOR RESEARCH ON THE STRUCTURE OF MATTER
(AFOSR 65-0770)
AD-617 209 FLD. 20

•AF49 638 1029
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
(AFOSR 65-0771)
AD-617 045 FLD. 20

•AF49 638 1170
ACOUSTICS AND SEISMICS LAB UNIV OF MICHIGAN ANN ARBOR
AD-617 053 FLD. 8
INSTITUTE OF SCIENCE AND TECH UNIV OF MICHIGAN ANN ARBOR
(AFCRL 65-406)
F AD-617 122 FLD. 8

•AF49 638 1207
GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y
AD-616 790 FLD. 22

•AF49 638 1250
TEXAS INSTRUMENTS INC DALLAS
(AFOSR 65-0773)
AD-617 054 FLD. 20

•AF49 638 1276
STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS
(AFOSR 65-0643)
AD-616 999 FLD. 20

•AF49 638 1333
PALMER PHYSICAL LAB PRINCETON UNIV N J
(AFOSR 65-0843)
AD-617 210 FLD. 20

•AF49 638 1337
SEISMOLOGICAL LAB CALIF INST OF TECH PASADENA
AD-616 476 FLD. 8

•AF49 638 1337 GRANT
SEISMOLOGICAL LAB CALIF INST OF TECH PASADENA
AD-617 039 FLD. 8

•AF49 638 1389
INSTITUTE OF THEORETICAL PHYSICS STANFORD UNIV CALIF
(AFOSR 65-0844)
AD-617 041 FLD. 20
(AFOSR 65-0848)
AD-617 043 FLD. 20
STANFORD UNIV CALIF
(AFOSR 65-0847)
AD-617 038 FLD. 20
INSTITUTE OF THEORETICAL PHYSICS STANFORD UNIV CALIF
(AFOSR 65-0846)
AD-617 042 FLD. 20

•AF49 638 1389 GRANT
STANFORD UNIV CALIF
(AFOSR 65-0845)
AD-617 040 FLD. 20

•AF49 638 1396
FLUID MECHANICS LAB MASS INST OF TECH CAMBRIDGE
AD-617 055 FLD. 1

•AF49 638 1491
DELAWARE UNIV NEWARK CENTER FOR RESEARCH ON SOCIAL BEHAVIOR
AD-616 632 FLD. 5

•AF49 638 209
ENRICO FERMI INST FOR NUCLEAR STUDIES UNIV OF CHICAGO ILL
(AFOSR 65-0837)
AD-617 044 FLD. 20

•AF49 638 441
BATTELLE MEMORIAL INST COLUMBUS OHIO
(AFOSR 65-0766)
AD-617 211 FLD. 20

•AF49 638 477
VITRO LABS WEST ORANGE N J
(AFOSR 3676)
AD-617 162 FLD. 20

•AF49 638 571
SYRACUSE UNIV N Y
(AFOSR 65-0866)
AD-617 208 FLD. 12

•AF49 638 700
RAND CORP SANTA MONICA CALIF
AD-616 700 FLD. 17
AD-616 727 FLD. 12
AD-616 780 FLD. 12
AD-617 079 FLD. 12
AD-617 105 FLD. 20
AD-617 106 FLD. 20
AD-617 131 FLD. 13
AD-617 188 FLD. 12

•AF49 638 775
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF METALLURGY
(AFOSR 65-0916)
AD-616 803 FLD. 11

•AF49 638 811
MINNESOTA UNIV MINNEAPOLIS
(AFOSR 65-0852)
F AD-616 788 FLD. 20

•AF49 638 924
REACTION MOTORS DIV THIOKOL CHEMICAL CORP DENVILLE N J
(AFOSR 65-0925)
F AD-617 120 FLD. 7

•AF49 638 992
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
(AFOSR 65-0335)
AD-616 898 FLD. 1

•AF49 657 9619SA3
RAND CORP SANTA MONICA CALIF
AD-616 701 FLD. 17

•AF61 052 186
OSLO UNIV (NORWAY)
(AFCRL 65-385)
AD-616 991 FLD. 3
(AFCRL 65-387)
AD-616 992 FLD. 3
(AFCRL 65-386)
AD-617 008 FLD. 3

•AF61 052 248
QUEEN MARY COLL UNIV OF LONDON (ENGLAND)
(AFOSR 65-0953)
AD-617 208 FLD. 6

•AF61 052 596
OXFORD UNIV (ENGLAND) DEPT OF NUCLEAR PHYSICS
(AFCRL 65-329)
F AD-617 063 FLD. 20

•AF61 052 658
MARBURG UNIV (WEST GERMANY) INSTITUT FUER THEORETISCHE PHYSIK
(AFOSR 65-0652)
F AD-616 782 FLD. 20

•AF61 052 678
KIRUNA GEOPHYSICAL OBSERVATORY (SWEDEN)
(AFCRL 65-330)
A AD-616 841 FLD. 4

•AF61 052 691
EDWARD DAVIES CHEMICAL LAB UNIVERSITY COLL OF WALES ABERYSTHWYTH
(AFCRL 65-389)
F AD-616 763 FLD. 20

•AF61 052 715
CENTRE DE PHYSIQUE ELECTRONIQUE ET CORPUSCULAIRE ORSAY (FRANCE)
(RADC TR-65-245)
AD-616 546 FLD. 9

•AT11 1 1328 GRANT
THEORETICAL CHEMISTRY INST UNIV OF WISCONSIN MADISON
AD-617 033 FLD. 20

•CDMH62 1 33
LANGLEY PORTER NEUROPSYCHIATRIC INST SAN FRANCISCO CALIF
AD-616 494 FLD. 5

•DA ARO D3 124693
TEXAS A AND M UNIV COLLEGE STATION
(AROD 2934:17)
AD-616 631 FLD. 12

•DA ARO D31 1246198
COLORADO UNIV BOULDER
AD-617 165 FLD. 7

•DA ARO D31 1246312
BELL TELEPHONE LABS INC MURRAY HILL N J
(AROD 1685:19)
AD-616 802 FLD. 9

•DA ARO D31 1246331
TOWNE SCHOOL OF CIVIL AND MECHANICAL ENGINEERING UNIV OF PENNSYLVANIA PHILADELPHIA
(AROD 3734:5)
AD-616 491 FLD. 20

•DA ARO D31 1246353
SYRACUSE UNIV N Y
(AROD 2653:18)
AD-616 816 FLD. 12

•DA ARO D31 1246410
VIRGINIA POLYTECHNIC INST BLACKSBURG
(AROD 2763:18)
AD-616 818 FLD. 12

•DA AROD31 1246122

CINCINNATI UNIV OHIO
(AROD 2276:7)
AD-616 449 FLD. 7

•DA ARO031 1246908
CALIFORNIA UNIV LOS ANGELES
(AROD 3870:3)
AD-616 822 FLD. 20

•DA CHL18 108 61628
NEW HAMPSHIRE UNIV DURHAM
AD-616 692 FLD. 6

•DA ORD 031124618S
NORTH CAROLINA UNIV CHAPEL HILL
(AROD 3179:6)
AD-616 448 FLD. 7

•DASA03 101
ARMED FORCES INST OF PATHOLOGY ARMY MEDICAL CENTER WASHINGTON D C
AD-616 949 FLD. 6

•DA11 022 ORD2059
MATHEMATICS RESEARCH CENTER UNIV OF WISCONSIN MADISON
AD-616 867 FLD. 12
AD-616 865 FLD. 12
AD-616 866 FLD. 12
AD-616 868 FLD. 12
AD-616 869 FLD. 12
AD-616 870 FLD. 12
AD-616 871 FLD. 12
AD-616 872 FLD. 12
AD-616 873 FLD. 12
AD-616 874 FLD. 12

•DA11 022ORD2059
MATHEMATICS RESEARCH CENTER UNIV OF WISCONSIN MADISON
AD-616 875 FLD. 12

•DA11 070AMC852W
REACTION MOTORS DIV THIOKOL CHEMICAL CORP DENVILLE N J
AD-616 649 FLD. 7

•DA18 108AMC131A
UNITED NUCLEAR CORP WHITE PLAINS N Y DEVELOPMENT DIV
AD-616 629 FLD. 20

•DA22 079ENG330
MASSACHUSETTS INST OF TECH CAMBRIDGE SCHOOL OF ENGINEERING
AD-616 737 FLD. 8

•DA22 079ENG354
WILSON NUTTALL RAIMOND ENGINEERS INC CHESTERTOWN MD
AD-616 616 FLD. 8

•DA28 043AMC00073E
COORDINATED SCIENCE LAB UNIV OF ILLINOIS URBANA
F AD-616 681 FLD. 20

•DA28 043AMC00119E
TEXAS INSTRUMENTS INC DALLAS
AD-616 781 FLD. 9

•DA28 043AMC00120E
FAIRCHILD SEMICONDUCTOR DIV FAIRCHILD CAMERA AND INSTRUMENT CORP MOUNTAIN VIEW CALIF
AD-616 738 FLD. 9

•DA28 043AMC00148E
BLILEY ELECTRIC CO ERIE PA
AD-617 110 FLD. 9

•DA28 043AMC00217E
RADIO CORP OF AMERICA CAMBRIDGE OHIO COMMUNICATIONS SYSTEMS DIV
F AD-616 515 FLD. 17

•DA28 043AMC00336E
VITRO LABS SILVER SPRING MD
F AD-616 645 FLD. 4

•DA28 043AMC00438E
AIRBORNE INSTRUMENTS LAB DEER PARK N Y
AD-616 635 FLD. 9

•DA30 069ORD2581
COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y
AD-617 015 FLD. 20
AD-617 016 FLD. 20

•DA30 069ORD3467
DAVIDSON LAB STEVENS INST OF TECH HOBOKEN N J
AD-616 636 FLD. 20

•DA31 124AROD35
NOYES CHEMICAL LAB UNIV OF ILLINOIS URBANA
(AROD 3815:5)
AD-616 830 FLD. 7

•DA36 039AMC00041E
MICROWAVE LAB STANFORD UNIV CALIF
F AD-616 743 FLD. 20

•DA36 039AMC01462E
RADIO CORP OF AMERICA CAMBRIDGE OHIO COMMUNICATIONS SYSTEMS DIV
AD-616A 744 FLD. 9

•DA36 039AMC02245E
CLEVITE CORP CLEVELAND OHIO
AD-617 187 FLD. 9

•DA36 039AMC02282E
PIONEER CENTRAL DIV BENDIX CORP DAVENPORT IOWA
AD-617 164 FLD. 9

•DA36 039AMC02333E
BELL TELEPHONE LABS INC MURRAY HILL N J
AD-617 184 FLD. 20

•DA36 039AMC02340E
SPERRY MICROWAVE ELECTRONICS CO CLEARWATER FLA
F AD-616 754 FLD. 9

•DA36 039AMC03200E
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-616 556 FLD. 20
AD-617 049 FLD. 4
AD-617 109 FLD. 20

•DA36 039AMC03200E GRANT
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-617 046 FLD. 20

•DA36 039AMC03274E
MICROWAVE ASSOCIATES INC BURLINGTON MASS
F AD-617 003 FLD. 9

•DA36 039AMC03321E
AIRBORNE INSTRUMENTS LAB DEER PARK N Y
(ECOM 03321-F)
F AD-617 128 FLD. 9

•DA36 039AMC03625E
HAMILTON STANDARD DIV UNITED AIRCRAFT CORP WINDSOR LOCKS CONN
AD-617 007 FLD. 13

•DA36 039AMC03737E
KAYSAM CORP OF AMERICA PATERSON N J
F AD-616 757 FLD. 11

•DA36 039AMC03737E
COOLEY ELECTRONICS LAB UNIV OF MICHIGAN ANN ARBOR
AD-616 608 FLD. 9

•DA36 039SC78050
SYLVANIA ELECTRONIC SYSTEMS NEEDHAM MASS
AD-616 853 FLD. 9
AD-616 854 FLD. 9

•DA36 039SC81274
CTS KNIGHTS INC SANDWICH ILL
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616 837	20
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616 841	4
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616 850	6
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616 885	16
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616 888	21
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616 890	4
616 891	13
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617 216	9
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617 219	20
617 220	14
617 221	20
617 222	6

OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index

01. Aeronautics

AD-442 900 Field 1A
CFSTI Price: HC$3.00

Flight Sciences Lab., Inc., Buffalo, N. Y.
A GENERAL INVESTIGATION OF HYPERSONIC STABILITY AND CONTROL UNDER TRIMMED FLIGHT CONDITIONS.
Quarterly technical rept. no. 2.
24 Jun 64, 83p Rept. no. R-63-011-109
Contract NOw64 0201c
N64 25380

Unclassified report

Descriptors: (*Aerodynamic configurations, Stability), (*Stability, Hypersonic flow), Hypersonic characteristics, Conical bodies, Delta wings, Blunt bodies, Equations, Mathematical analysis, Force-(Mechanics), Pressure, Damping, Roll, Nose cones, Moments, Control.

Analytic equations were determined for the force and moment coefficients and stability derivatives of various shapes in Newtonian flow. Equations for all the important damping derivatives of the cone at zero sideslip and roll have been determined as a function of angle of attack. The constants in these simple equations can be determined numerically for any C. G. location and any cone angle. For slender cones, with certain restrictions on the C. G. location, the constants in the stability derivative equations have also been determined analytically. Similar results have been obtained for the delta planform with diamond shape cross-section perpendicular to the longitudinal axis. A preliminary investigation has also been conducted on the elliptic cone, and equations have been established for the longitudinal force coefficients. A preliminary investigation has been made of the effects of bluntness on the constants in the stability equations. An initial investigation has been undertaken into other hypersonic theories, besides Newtonian, for predicting surface pressures. (Author)

AD-449 858 Field 1D
CFSTI Price: HC$2.00

Naval Air Development Center, Johnsville, Pa.
Aeronautical Instruments Lab.
INTERIM PILOT INSTRUMENT PANEL FOR THE P3/A-NEW AIRCRAFT.
Final rept. for 1 May-2 Oct 64,
by William M. Ogden and George W. Hildebrand.
2 Oct 64, 46p NADC-AI-6465
Task RAV09J011 2021F012 04 04

Unclassified report

Descriptors: (*Antisubmarine aircraft, Instrument panels), (*Instrument panels, Antisubmarine aircraft), Display systems, Instrumentation, Effectiveness, Cockpits, Design, Flight instruments, Vision, Flight crews, Command + control systems, Human engineering.

The cockpit of the P3-A aircraft used for modern ASW exercises has been found to be inadequate. A study was made of the P3 and its associated problems. Appropriate recommendations are made for an interim pilot's instrument panel. Continuing studies are required to implement recommendations for the total cockpit. (Author)

N65-16591 Field 1A, 22C
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
EFFECTS OF UNCERTAINTIES IN THE THERMAL CONDUCTIVITY OF AIR ON CONVECTIVE HEAT TRANSFER FOR STAGNATION TEMPERATURE UP TO 30,000K,
by John T. Howe and Yvonne S. Sheaffer. Feb 65,
41p NASA-TN-D-2678

Unclassified report

Descriptors: (*Thermal conductivity, Stagnation point), (*Atmosphere entry, Heat transfer).

N65-16891 Field 1A
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A MODIFIED METHOD OF INTEGRAL RELATIONS FOR SUPERSONIC NONEQUILIBRIUM FLOW OVER A WEDGE,
by Perry A. Newman. Feb 65, 39p
NASA-TN-D-2654

Unclassified report

Descriptors: (*Supersonic flow, Wedges), (*Wedges, Nonequilibrium flow).

N65-16892 Field 1C, 1D
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
TRIM REQUIREMENTS AND STATIC-STABILITY DERIVATIVES FROM A WIND-TUNNEL INVESTIGATION OF A LIFTING ROTOR IN TRANSITION,
by Julian L. Jenkins, Jr. Feb 65, 36p
NASA-TN-D-2655

Unclassified report

Descriptors: (*Rotary wings, Design).

N65-17116 Field 1C
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
WIND-TUNNEL INVESTIGATION OF A LIFTING ROTOR OPERATING AT TIP-SPEED RATIOS FROM 0.65 TO 1.45,
by Julian L. Jenkins, Jr. Feb 65, 20p
NASA-TN-D-2628

Unclassified report

Descriptors: (*Rotary wings, Lift).

N65-21741 Field 1C
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
EFFECT OF FACE-SHEET STIFFNESS ON BUCKLING OF CURVED PLATES AND CYLINDRICAL SHELLS OF SANDWICH CONSTRUCTION IN AXIAL COMPRESSION,
by Robert E. Fulton. Apr 65, 26p NASA TN D-2783
Unclassified report

Descriptors: (*Metal plates, Buckling(Mechanics)), (*Structural shells, Buckling(Mechanics)), Cylindrical bodies, Sandwich construction, Compressive properties, Sheets, Theory, Equations.

N65-21742 Field 1D, 1C
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A VISUAL FLIGHT INVESTIGATION OF HOVERING AND LOW-SPEED VTOL CONTROL REQUIREMENTS,
by John F. Garren, Jr., James R. Kelly, and John P. Reeder. Apr 65, 16p NASA TN D-2788
Unclassified report

Descriptors: (*Vertical take-off planes, Flight control systems), (*Helicopters, Flight control systems), Hovering.

Patent 3,181,822 Field 1D

'WHEELS-UP' FLARE WARNING SYSTEM.
Patent assigned to Navy,
by Sanford Russell Allen and Kenneth R. Foote.
4 May 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Flares, Landing aids), (*Aviation safety, Flares), (*Air traffic control systems, Flares), Runways, Pyrotechnics, Approach, Landing gear, Patents.

The 'wheels-up' flare warning system is operated from an airfield control tower to fire a plurality of pyrotechnic warning flares along a single selected runway as a pilot warning for aircraft approaching the runway with its wheels in a partially, or fully, retracted condition. A plan of the airfield and switches for firing each of the mortars ejecting the flares are located in the tower.

02. Agriculture

CONF-640807-1 Field 2E, 6C
CFSTI Prices: HC$1.00 MF$0.50

Minnesota Univ., St. Paul. Coll. of Veterinary Medicine.
STUDIES OF BOVINE LEUKEMIA IN MINNESOTA,
by D. K. Sorensen, R. K. Anderson, and V. Perman. 1963, 14p
Contract AT(11-1)-410 Unclassified report
Presented at 3rd International meeting on diseases of cattle, Copenhagen.

Descriptors: (*Bovines, Leukemia), (*Veterinary medicine, Bovines).

03. Astronomy and Astrophysics

No entries

04. Atmospheric Sciences

PB-167 554 Field 4B, 22B
CFSTI Prices: HC$3.00 MF$0.50

Wisconsin Univ., Madison. Dept. of Meteorology.
AN ANALYSIS OF DIURNAL VARIATIONS IN TIROS II RADIATION DATA. THE ROLE OF SYNOPTIC SCALE VARIATIONS OF INFRARED RADIATION IN THE GENERATION OF AVAILABLE POTENTIAL ENERGY.
Annual rept.,
by Elford G. Astling, Lyle H. Horn, and James L. Corcoran. Oct 64, 52p
Grant WBG10, Proj. 4
N65 15522
Unclassified report

Descriptors: (*Meteorological satellites, Infrared radiation), (*Infrared radiation, Diurnal variations), Meteorological parameters, Oceanographic data, Earth, Atmosphere, Sampling, Calibration, Graphics.

Twenty-six days of TIROS II data are used to study diurnal variations of infrared radiation (7-32 microns). A diurnal trend is noted. When the data are partitioned into land and ocean data, diurnal variations are found in both cases. A diurnal trend in the land cases was expected; however, the trend over oceanic areas was not anticipated. An analysis of sampling procedures used in the study indicates that the oceanic trend is not the result of a sampling bias. The possible causes for this trend include a number of instrument calibration problems and a number of physical processes occurring within the earth-atmosphere system. Because a number of possible causes exists, the authors suggest that dirunal variations in TIROS II infrared observations be interpreted with caution. (Author)

PB-167 573 Field 4B, 14E
CFSTI Prices: HC$4.00 MF$1.00

Florida State Univ., Tallahassee. Dept. of Meteorology.
STUDIES OF TIROS DATA OVER THE TROPICAL ATLANTIC SUPPLEMENTED BY CONCURRENT AIRCRAFT PHOTOGRAPHY.
Final rept.,
by N. E. La Seur. Dec 64, 132p
Grant WBG16
Unclassified report

Descriptors: (*Meteorological satellites, Marine meteorology), (*Marine meteorology, Atlantic Ocean), (*Cloud cover, Aerial photography), (*Aerial photography, Meteorological satellites), Weather forecasting, Tropical regions, Meteorological instruments, Airborne.

The objective of this research is improved understanding of cloud photography from meteorological satellites over the tropical oceans. This involves improved, more precise interpretations of just what it is that the satellite appears to see. It also involves the recognition and development of opportunities for employing the meteorological satellite as one of perhaps several tools to be used in the solution of scientific problems. The philosophy underlying the research is that the most worthwhile results should emerge from the

study of those situations in which the satellite data are most adequately supplemented by conventional meteorological data, aircraft data, and ground or airborne photography. The field program described in this report was designed to help create a suitable data sample, and was successfully completed under this grant.

PB-167 626 Field 4B
CFSTI Prices: HC$3.00 MF$0.75

Travelers Research Center, Inc., Hartford, Conn.
DEVELOPMENT OF PREDICTION EQUATIONS FOR HURRICANE MOVEMENT.
Final rept.,
by Keith W. Veigas. Jun 62, 62p
Rept. no. 7073-30
Contract Cwb10170

Unclassified report

Descriptors: (*Hurricane tracking, Mathematical prediction), (*Tropical cyclones, Air mass analysis), (*Air mass analysis, Tropical Cyclones), Marine meteorology, Weather forecasting, Feasibility studies.

Statistical prediction equations are derived for the 12-, 24-, and 36-hr displacement of hurricanes. Special attention is directed to cases in which previously derived prediction equations do not apply and to cases in which uncertainities in specification of certain classes of predictors cause large forecast errors. Feasibility studies concerning the predictability of 72-hour displacements and changes in hurricane intensity are presented. Suggestions for future extensions of the research are made. (Author)

PB-167 629 Field 4B
CFSTI Prices: HC$0.50 MF$0.50

Department of Commerce, Washington, D. C.
Office of Federal Coordinator for Meteorological Services and Supporting Research.
THE FEDERAL PLAN FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH, FISCAL YEAR 1966.
1965, 51p

Unclassified report

Descriptors: (*Weather forecasting, United States Government), (*Research program administration, Weather forecasting), (*Meteorology, Management engineering), Meteorological satellites, Federal budgets, Upper atmosphere, Radiosondes.

This plan was prepared to serve the following purposes: (1) to provide the Congress with a single source for reviewing the overall Federal program in meteorological services and supporting research; (2) to provide the Federal agencies with an overall framework within which to review their own plans and programs in meteorological services and supporting research; (3) to provide the Administration with a basis for better management of an essential program which involves many Federal agencies.

PB-167 653 Field 4B
CFSTI Prices: HC$3.00 MF$0.75

RAND Corp., Santa Monica, Calif.
A NEW RATIONAL APPROACH TO WEATHER-CONTROL RESEARCH.
Final rept.,
by S. M. Greenfield, R. E. Huschke, Yale Mintz, R. R. Rapp, and J. D. Sartor. May 62, 92p
Rept. no. RM-3205-NSF
Contract NSF C252 Unclassified report

Descriptors: (*Artificial precipitation, Scientific research), (*Meteorology, Artificial precipitation), (*Atmosphere, Meteorological phenomena), Weather forecasting, Climatology, Control, Research program administration.

This report presents the final results of a six-month study conducted for the National Science Foundation. The purpose of the study was to assist the National Science Foundation in formulating its future approach to research on weather modification and control. The study did not include budgetary considerations but analyzed past and present attempts to modify the weather and considered suggestions for achieving weather control. The report recommends a program of coordinated research in weather control within the context of all the atmospheric sciences.

PB-167 788 Field 4A
CFSTI Prices: HC$3.00 MF$0.75

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
SOLAR COSMIC RAYS IN A REGULAR INTERPLANETARY MAGNETIC FIELD.
Antarctic Research and Data Analysis,
by Sidney M. Bennett. 27 Jan 65, 74p
Scientific rept. no. SR-19, RAD-TR-64-43
Contract NSF C255

Unclassified report

See also PB-167 791.

Descriptors: (*Cosmic rays, Solar radiation), (*Solar radiation, Magnetic fields), (*Polar regions, Solar radiation), Neutrons, Periodic variations, Protons, Solar disturbances.

The theory of high-energy protons in a regular interplanetary magnetic field is extended to admit the strong heliocentric dependence of the interplanetary magnetic field strength, resulting in an event decay phase whose character is somewhat steeper than inverse time squared. Detailed comparison is made with the Explorer XII data for the 28 September 1961 event. Good to excellent fits are obtained for all energies for which data were obtained (2.2 - 430 MeV). The temporal and spatial variations of an impulse source of high-energy protons in the magnetic field of a filamentary current are investigated. Late in the event, the center of the magnetic tube becomes depleted and only the boundary region retains a significant number of protons and may be the mechanism producing the SC-max tax type polar cap absorption (PCA). Pre-SC-max PCA events result when the earth is near the center of a magnetic tube at the time of solar cosmic ray injection. Should the magnetic tube co-rotate with the solar active region, the 27-day recurrence tendency in energetic protons observed by Explorer XII and by 2.3 Mc ionospheric backscatter would result from long-term storage of protons in the regular interplanetary magnetic field. It is concluded that the magnetic plasma streams arising in solar centers of activity may determine the temporal and spatial features of high-energy proton events.

PB-167 791 Field 4A
CFSTI Prices: HC$3.00 MF$0.75

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ANTARCTIC RESEARCH AND DATA ANALYSIS.
Final rept. for 15 Feb 62-14 May 65,
by S. M. Bennett, S. C. Coroniti, J. R. Herman, R. B. Penndorf, and G. F. Rourke. 14 May 65, 58p
RAD-TR-65-8
Contract NSF C255 Unclassified report

Descriptors: (*Geophysics, Polar regions), (*Ionosphere, Polar regions), (*Polar regions, Reports), Terrestrial magnetism, Aurorae, Data, Data processing systems, Research program administration, Electron density, Abstracting, Atmospheric electricity.

Research and data analysis applied to the Antarctic geophysical environment has been carried out for the past 3 years. The objective has been threefold: (1) basic geophysical research, (2) suggestions for future Antarctic programs, and (3) suggested means of expediting data acquisition and processing in a form suitable for machine analysis. Results of the research program are presented in the form of abstracts to the 21 scientific reports prepared under this contract. In addition, a listing is given of related journal publications and symposium papers. The specific research programs suggested are mainly experimental, in the fields of ionospheric physics, geomagnetism, auroral physics, and atmospheric radio noise. Conclusions reached concerning the expedition of data are in essence negative. Reasons are given. (Author)

05. Behavioral and Social Sciences

N65-17877 Field 5J, 1B
CFSTI Prices: HC$2.00 MF$0.50

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
LABORATORY TESTS OF SUBJECTIVE REACTIONS TO SONIC BOOM,
by K. S. Pearsons and K. D. Kryter. Mar 65, 34p
Contract NASr58
NASA CR-187
Unclassified report

Descriptors: (*Sonic boom, Simulation), (*Reaction-(Psychology), Airplane noise), Adjustment(Psychology), Adaptation(Physiology).

PB-167 357 Field 5B, 9B, 5G
CFSTI Prices: HC$1.00 MF$0.50

Computation Lab., Harvard Univ., Cambridge, Mass.
AUTOMATIC INFORMATION PROCESSING IN WESTERN EUROPE,
by Gerard Salton. 1963, 8p
Unclassified report

Pub. in Science v144 n3619 p626-32 May 8 1964.

Descriptors: (*Documentation, Europe), (*Information retrieval, Europe), Automatic, Computers, Reports, Analysis, Programming languages, Compilers, Language, Classification, Statistical analysis, Subject indexing, Great Britain, France.

Current European work in automatic documentation and information processing is reviewed and evaluated.

PB-167 373 Field 5G
CFSTI Prices: HC$4.00 MF$1.00

Ohio State Univ. Research Foundation, Columbus.
MANDARIN TONE STUDY. RESULTATIVE VERBS AND OTHER PROBLEMS. PRE-NOMINAL MODIFIERS. TWO ASPECT MARKERS IN MANDARIN.
Project on Linguistic Analysis rept. (Rept. no. 2)
by Robert Brotzman, Anne Yue Hashimoto, Sandra Annear, and William S-Y. Wang. Apr 64, 150p
Rept. no. POLA-8
Grant NSF GN174, Proj. 1685
Unclassified report

Descriptors: (*Language, Analysis), Speech representation, China.

Contents:
Mandarin tone study, by Robert Brotzman: The form of a generative system for fundamental voice frequency in Mandarin is discussed. Data were gathered from 2 speakers, the data gathering system including a modified Vocoder pitch extractor. Examples were given of the 4 basic tones of Mandarin, and rules were proposed that would account for the tone sandhi and allotonic changes evident in Mandarin speech
Resultative verbs and other problems, by Anne Yue Hashimoto: Constituent structure, sample lexicon, transformations
Ordering of pre-nominal modifiers in English, by Sandra S. Annear, including derivations of each of the types of single modifiers: transformationally derived modifiers and modifiers derived from constituent-structure rules
Two aspect markers in Mandarin, by William S-Y. Wang.

PB-167 625 Field 5B, 5A
CFSTI Prices: HC$3.00 MF$0.75

Herner and Co., Washington, D. C.
SOME CHARACTERISTICS OF THE REVIEW LITERATURE IN EIGHT FIELDS OF SCIENCE,
by Carolyn Fix, David T. H. Campbell, and William A. Creager. 11 Mar 64, 57p
Unclassified report

Descriptors: (*Documentation, Scientific research), (*Scientific research, Indexes), Reviews, Abstracting, Periodicals, Astronomy, Biology, Medicine, Geophysics, Chemistry, Engineering, Mathematics, Meteorology, Physics.

PB-167 681 Field 5A, 3A, 8J, 7-, 20C, 20K, 11F, 20F, 9-, 20L, 14B
CFSTI Prices: HC$1.25 MF$0.75

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Jun 65, 60p
Unclassified report

Descriptors: (*Naval research, Reports), (*Ocean bottom, Naval research), (*Moon, Radio astronomy), Chemistry, Surface-active substances, Cleaning compounds, Freezing point depressants, Batteries + components, Cesium, Electricity, Superconductivity, Mechanics, Fracture(Mechanics), Strain(Mechanics), Vibration, Metallurgy, Steel, Welding, Titanium alloys, Tungsten, Niobium, Nickel, Ferromagnetic materials, Freezing, Corrosion, Aluminum alloys, Optics, Underwater lights, Radio, Antennas, Multiplex, Electric discharges, Lasers, Solid state physics, Gas filters, X rays, Electron beams, Radiation measurement systems, Zinc, Holmium, Ytterbium, Logarithmic amplifiers, Mass spectrometers, Coils, Patents.

CONTENTS
Research at the Bottom of the Ocean, by C. L. Buchanan
Decameter Wave Radar Studies of the Lunar Surface, by J. R. Davis, D. C. Rohlfs, G. A. Skaggs, and J. W. Joss
Chemistry: Surface chemical methods of displacing water and/or oils and salvaging flooded equipment. Part 4--aggressive cleaner formulations for use on corroded equipment. Effects of a jet fuel anti-icing additive on fuel tank linings. Microscopic observations

supporting the theory of lead ion supersaturation as the cause of the initial voltage minimum in the discharge curve of the lead-acid battery. Active material retention in the lead-acid battery. High-temperature properties of cesium

Electricity: A technique for separating the magnetic field intensity due to a transport or persistent current from the total field of a superconducting body

Mechanics: Fracture study of orthotropic materials. Effect of side grooving on measurements of plane strain fracture toughness. Some thoughts on mobility and impedance concepts associated with mechanical vibration problems

PB-167 776 Field 5B
CFSTI Prices: HC$1.00 MF$0.50

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
INFORMATION STORAGE REQUIREMENTS FOR THE CONTENTS OF THE WORLD'S LIBRARIES,
by John W. Senders. 3 Jul 63, 2p
Unclassified report

Pub. in Science v141 n3585 p1067-8 Jul 19 1963.

Descriptors: (*Libraries, Storage), Documentation, Information retrieval, Data storage systems, Computers.

Three calculations of the number of different things stored in the world's libraries yield estimates from 7.5 x 10 to the 7th power to 7.7 x 10 to the 8th power. At 10 to the 5th power words per volume, five letters per word, and 12 bits per letter, the information capacity used for storage is between 4.6 x 10 to the 14th power and 4.6 x 10 to the 15th power bits, and is increasing at about 2 x 10 to the 6th power bits per second. In the course of a project aimed at understanding the problems and possibilities of the library (or the successor of libraries) of the next century, we have collected and reorganized information about the size of the world's literature. The information is useful as a basis for estimating the magnitude of the storage problem. (Author)

06. Biological and Medical Sciences

AD-417 814 Field 6D, 9B
CFSTI Price: HC$2.00

Radio Corp. of America, Bethesda, Md. Data Systems Center.
ADVANCED RECOGNITION TECHNIQUES STUDY.
Quarterly progress rept. no. 2, 1 Apr-30 Jun 63,
by R. B. Thomas and Michael Kassler. 30 Jun 63, 28p
Contract DA36 039AMC00112E, Proj. 3A99 22 001 02
Unclassified report

Descriptors: (*Language, Character recognition), (*Character recognition, Programming(Computers)), (*Pattern recognition, Programming(Computers)), Computers.

The results are given of the second research phase of a study aimed at developing techniques to enhance the output of a hypothetical character-recognition machine by producing solutions in those instances where the machine fails to identify a character within an English word in normal technical text material. The extension of the earlier syllable grammar to include contextual constraints within single criteria such as elementary morphological analyses and tetragram lists. Several RCA-301 computer codes which analyze data and implement the new algorithms are described.

HW-81746 Field 6R
CFSTI Prices: HC$7.00 MF$1.75

Hanford Atomic Products Operation, Richland, Wash.
HANFORD RADIOLOGICAL SCIENCES RESEARCH AND DEVELOPMENT ANNUAL REPORT FOR 1963.
ed by C. C. Gamertsfelder and J. K. Green. Jan 64, 386p
Contract AT(45-1)-1350
Unclassified report

Descriptors: (*(*Radiobiological contamination, Radiobiology), (*Radioactivity, Health physics instrumentation).

LF-17 Field 6R
CFSTI Prices: HC$1.00 MF$0.50

Lovelace Foundation For Medical Education and Research, Albuquerque, N. Mex.
RESPONSE TO SECONDARY ANTIGENIC STIMULUS AFTER WHOLE BODY X-IRRADIATION IN THE BEAGLE,
by F. F. Pindak, J. F. Stara, and W. E. Clapper.
Sep 64, 17p
Contract AT(29-2)-1013
Unclassified report

Descriptors: (*Dogs, Radiation effects), (*Antigens + Antibodies, Radiobiology).

Patent 3,179,623 Field 6E, 7C

METHOD OF PREPARING A MONOMER HAVING PHENOXY AND METHACRYLATE GROUPS LINKED BY HYDROXY GLYCERYL GROUPS.
Patent assigned to Commerce,
by Rafael L. Bowen. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Dental materials, Preparation), Acrylic resins, Silicates, Polymers, Silicon compounds, Dioxides, Phenols, Alcohols, Hydroxides, Patents.

The monomer is for use in preparing dental fillings for anterior teeth. It consists of about 70 percent by weight of finely divided fused silica particles and a polymer. The monomer is characterized by phenoxy and acrylate or methacrylate groups linked by glycerol residues, specifically by the group 2 hydroxy, 1,3-glyceryl.

Patent 3,179,653 Field 6F, 6F, 6C

METHOD OF PRODUCING A PHYTOTOXIN.
Patent assigned to Agriculture,
by Robert T. Sherwood. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Toxins + antitoxins, Preparation), (*Fungi, Toxins + antitoxins), (*Herbicides, Preparation), Solvents, Solvent extraction, Proteins, Polysaccharides, Chromatographic analysis, Patents.

The phytotoxin has herbicidal properties. The process of preparing it involves growing the fungus, R. solani in a nutrient medium, extracting the culture with water or a polar solvent, precipitating the proteins, polysaccharides, and other contaminating large molecules from the aqueous or polar solvent extract, concentrating the extract, extracting the concentrated preparation with a nonpolar solvent, concentrating the nonpolar extract, and recovering the phytotoxin from the latter by chromatography.

Patent 3,180,792 Field 6F, 7C

INSECT CHEMOSTERILANTS.
Patent assigned to Agriculture,
by Charles W. Woods and Alexej B. Borkovec.
27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Pest control, Organic sulfur compounds), (*Organic sulfur compounds, Pest control), (*Diptera, Pest control), (*Fertility, Inhibition), Insects, Reproduction(Physiology), N-heterocyclic compounds, Patents.

The synthetic organic compound is for the control or eradication of insect populations by causing sexual sterility in the insect. Sulfur containing derivatives of aziridine are incorporated in the food of the screw-worm fly, house fly, and the Mexican fruit fly. One compound is 1,1'-sulfinyldiaziridine.

Patent 3,180,891 Field 6F, 7C

METHOD FOR PREPARING THIOFORMANILIDE.
Patent assigned to Agriculture,
by Sameul E. Ellzey, Jr., and Charles H. Mack.
27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Fungicides, Preparation), (*Pesticides, Preparation), (*Insecticides, Preparation), (*Organic sulfur compounds, Pesticides), (*Organic nitrogen compounds, Pesticides), Thiocyanates, Sodium compounds, Borohydrides, Patents.

Thioformanilide is useful as an antimycotic agent, acaricide and insecticide. It is prepared by reacting an equivalent weight of phenyl isothiocyanate and at least two equivalents of sodium borohydride in an inert organic solvent in which they are mutually soluble at 40 degrees C. until heat is no longer evolved. The thioformanilide is then isolated from the reaction mixture.

PNE-241F Field 6R, 18H
CFSTI Prices: HC$3.00 MF$0.50

Southwestern Radiological Health Lab., Las Vegas, Nev.
IODINE INHALATION STUDY FOR PROJECT SEDAN, JULY 6, 1962.
20 May 64, 60p
Unclassified report

Descriptors: (*Iodine, Absorption), (*Radioactivity, Iodine).

TID-7696 Field 6R, 6A
CFSTI Prices: HC$6.00 MF$1.75

General Atomic, San Diego, Calif.
PROCEEDINGS OF THE ANNUAL CONFERENCE ON BIO-ASSAY AND ANALYTICAL CHEMISTRY (9th) OCTOBER 10 AND 11, 1963, SAN DIEGO, CALIFORNIA.
1964, 244p CONF-212
N64 33139
Unclassified report

Descriptors: (*Biological assay, Health physics), (*Radiobiology, Biochemistry).

07. Chemistry

N65-16884 Field 7D, 20I, 1A
CFSTI Prices: HC$2.00 MF$0.50

General Motors Corp., Santa Barbara, Calif.
CARBON DIOXIDE DISSOCIATION RATES BEHIND SHOCK WAVES,
by M. Steinberg. Feb 65, 24p
Contract NAS7 217
NASA CR-166
Unclassified report

Descriptors: (*Carbon dioxide, Dissociation), (*Shock waves, Chemical reactions).

Patent 3,178,256 Field 7B, 18G

METHOD FOR SEPARATING TRANSPLUTONIUM ELEMENTS FROM RARE EARTH FISSION PRODUCTS.
Patent assigned to AEC,
by Fletcher L. Moore. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Transuranium elements, Separation), (*Fission products, Rare earths), Patents.

The process may be employed to separate any one or all of the transplutonium elements from any one or all of the rare earth values. It is particularly useful in separating americium from promethium. An aqueous solution of the values provided with a high concentration of lithium chloride. A small amount of hydrochloric acid improves the separation factor. The solution is also treated with a tertiary amine in a solution to transfer transplutonium values into an organic solution. The solution is separated out and the desired values are recovered.

Patent 3,180,886 Field 7C

PREPARATION OF AROMATIC PEROXY ACIDS.
Patent assigned to Agriculture,
by Leonard S. Silbert and Daniel Swern. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Oxidizers, Preparation), (*Aromatic compounds, Peroxides), (*Peroxides, Synthesis-(Chemistry)), Benzoates, Hydrogen peroxide, Sulfonic acids, Solvents, Nitrates, Nitriles, Patents.

The invention relates to the preparation of peroxybenzoic acid and other aromatic peroxy acids in very high yields and excellent purity by the reaction of the aromatic acid or its ester with hydrogen peroxide using methanesulfonic acid or ethanesulfonic acid as the solvent and reaction medium. Compounds specifically claimed are p-tert-butylperoxybenzoic acid, o-nitroperoxybenzoic acid, and p-cyanoperoxy-bezoic acid.

Patent 3,182,028 Field 7C, 20C, 9A

PREPARATION OF POLYMERIC MATERIALS BY THE REACTION OF ARYLDIPHOSPHINES WITH ARYL DIAZIDES.
Patent assigned to Navy,
by David L. Herring. 4 May 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Polymers, Preparation), (*Phosphines, Chemical reactions), (*Organic nitrogen compound, Chemical reactions), (*Aromatic compounds, Chemical reactions), Dielectrics, Semiconductors, Patents.

The polymeric materials are useful dielectric materials and may also be useful semi-conductor materials. The polymers are prepared from the reaction of 1,4-bis(diphenylphosphino)benzene with 1,4-diazidobenzene.

08. Earth Sciences and Oceanography

PB-167 544 Field 8K
CFSTI Prices: HC$2.00 MF$0.50

Seismological Field Survey, San Francisco, Calif.
ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST AND THE WESTERN MOUNTAIN REGION MSA-112, 1 OCTOBER 1961 TO DECEMBER 1961.
1963, 49p
Unclassified report

Descriptors: (*Earthquakes, United States), (*Seismology, United States), Geophysics, Abstracting.

The abstracts are divided into three groups: (1) California and Western Nevada, (2) Washington and Oregon, and (3) the Western Mountain Region.

PB-167 588 Field 8E, 9B
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
THE USE OF THE 1620 IN THE COAST AND GEODETIC SURVEY,
by Charles A. Whitten. 12 Nov 62, 8p
Unclassified report

Rept. presented at the meeting of the 1620 Users Group, Miami Beach, Fla., 12 Nov 62.

Descriptors: (*Geodesics, Computers), Data processing systems, Geophysics, Earth, Measurement, Earthquakes, Least squares method, Programming languages.

PB-167 592 Field 8K, 17J
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
REPORT ON MAGNETIC SURVEY AND SEISMOLOGICAL OBSERVATIONS MADE IN THE VICINITY OF PARICUTIN VOLCANO, IN MICHOACAN STATE, MEXICO, MAY-JULY, 1943,
by Ralph R. Bodle and Nelson C. Steenland. Jan 44, 35p
Unclassified report

Descriptors: (*Seismology, Mexico), (*Volcanoes, Mexico), Seismological stations, Magnetometers, Magnetic fields, Terrestrial magnetism, Terrain, Population, Tables.

PB-167 657 Field 8B, 8E
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
ANALYTIC RELATIVE ORIENTATION IN PHOTOGRAMMETRY,
by G. C. Tewinkel. 1961, 21p
Unclassified report

Rept. presented at the United Nations Regional Cartographic Conference for Asia and the Far East (3rd), Bangkok, Thailand, 27 Oct-10 Nov 61, in support of Agenda Item 15, Topography and Photogrammetry, (e) New Methods and Techniques in Photogrammetry.

Descriptors: (*Photogrammetry, Numerical methods + procedures), (*Geodesics, Photogrammetry), Aerial photographs, Position finding, Analytic geometry, Matrix algebra, Stereoscopic map plotters.

This paper relates to computational details encountered in the problem of relative orientation, which is one of several problems involved in analytic photogrammetry--the computational method of determining the positions in three dimensions of objects from the measured coordinates of their images on photographs. A technique is employed which enables the iterative solution to converge and at the same time allows the solution to remain small, namely, involving only five independent unknowns. The major computational task involves the evaluation of 14 coefficients of a pair of observation equations associated with each image. Although the topic of relative orientation of two photographs is considered throughout, the same basic operations are involved whether the problem is the resection of a single photograph or the adjustment of an entire strip or block of many overlapping photographs: the same observation equations and 14 coefficients are utilized.

PB-167 659 Field 8B, 8E, 22B
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
PHOTOGRAMMETRY APPLIED TO THREE-DIMENSIONAL GEODESY,
by Hellmut H. Schmid. 1964, 43p
Unclassified report

Rept. prepared for presentation to the Congress of the International Society of Photogrammetry, Lisbon, Portugal, Sep 64.
Pub. in le Bulletin de la Societe Francaise de Photogrammetrie.

Descriptors: (*Photogrammetry, Geodesics), (*Geodesics, Photogrammetry), (*Satellites(Artifical), Photogrammetry), Mapping, Geophysics, Geometry.

PB-167 660 Field 8B, 17G
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
REFINEMENT OF THE CHART PROJECTION BASE FOR LONG RANGE AIR NAVIGATION,
by Filip F. Junek. 1964, 20p Unclassified report

Rept. presented at the Regional Convention of the American Congress on Surveying and Mapping, Kansas City, Mo., 24-26 Sep 64.

Descriptors: (*Map projection, Navigation charts), (*Navigation charts, Aircraft), Position finding, Direction finding, Projective geometry, Distortion.

In charting for air navigation, the Aeronautical Chart Division of the U. S. Coast and Geodetic Survey provides charts on projection bases which will best serve the needs of navigators. Flights of longer distances at

increasing speeds have necessitated improvements in the various tools of the navigator. Improvements in position finding and tracking equipment, and refinements in navigation techniques require suitable charts for working bases. Only certain conformal chart projections are adequate for chart needs. It is necessary that each chart be on the proper type of projection in its best suited form in order to serve the navigator environment. Projection bases used for long range air navigation charts are considered, with special regard to scale variation, directional reference, and great circle representation as affected by the distortions which are inevitable in projections. Attention will also be devoted to directional reference applications of the navigational grid and isogriv systems. (Author)

PB-167 661 Field 8B, 8E, 22B
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
SATELLITE PHOTOGRAMMETRY,
by Hellmut H. Schmid. 1964, 44p
Unclassified report

Descriptors: (*Photogrammetry, Satellites-(Artificial)), (*Geodesics, Photogrammetry), Mapping, Geophysics, Gravity, Geometry.

PB-167 662 Field 8E
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
REFORMATORY AND REVOLUTIONARY ASPECTS IN GEODESY,
by Hellmut H. Schmid. 1964, 17p
Unclassified report

Rept. presented at the Meeting of the American Geophysical Union, Washington, D. C., 22 Apr 64.

Descriptors: (*Geodesics, Reviews), Geophysics, Satellites(Artificial), Photogrammetry, Numerical methods and procedures, Theory.

The significance of man-made satellites as tools to provide geodesy with the means for interconnecting the results of its geometrical and physical studies on a globe-wide concept is discussed.

PB-167 663 Field 8-, 13-
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
TODAY'S EARTH SCIENCES AND TOMORROW'S ENGINEERING,
by C. E. Barthel, Jr. 1964, 13p
Unclassified report

Symposium: Engineering for Tomorrow's Construction; Paper presented at the Annual Meeting of the Society of American Military Engineers (44th), Washington, D. C., 25 May 64.

Descriptors: (*Geophysics, Engineering), (*Engineering, Geophysics), Earth, Scientific research, Instrumentation.

The future growth of new areas of engineering based on the present day research in the earth sciences is discussed.

PB-167 664 Field 8E
CFSTI Prices: HC$1.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
PRACTICAL APPROACHES TO THE ESTABLISHMENT OF GEODETIC CONTROL,
by Lawrence W. Swanson. 1963, 12p
Unclassified report

Rept. presented to the United Nations Regional Cartographic Conference for Africa, Nairobi, Kenya, 1-13 Jul 63, in support of Agenda Item 13 (a). Available copy will not permit fully legible reproduction.

Descriptors: (*Geodesics, Position finding), Instrumentation, Civil engineering.

The use of new electronic distance-measuring instruments, theodolites and levels is discussed as a means of providing the emerging nations with tools of high geodetic precision for undertaking accurate control surveys.

PB-167 665 Field 8E, 8B, 22B
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
THE METHOD OF PASSIVE SATELLITE TRIANGULATION,
by Hellmut H. Schmid. 1964, 41p
Unclassified report

Rept. presented to the United Nations Regional Cartographic Conference for Asia and the Far East (4th), Manila, Philippines, 21 Nov-5 Dec 64, in support of Agenda Item 8.

Descriptors: (*Geodesics, Surveying), (*Surveying, Satellites(Artificial)), Gravity, Geometry, Geophysics, Earth, Communication satellites(Artificial), Photogrammetry.

09. Electronics and Electrical Engineering

AD-296 472 Field 9A
CFSTI Price: HC$3.00

Weston Instruments and Electronics Div., Daystrom, Inc., Newark, N. J.
A POROUS SUBSTRATE RESISTOR AIMED AT MINIATURIZATION OF METAL-FILM RESISTORS.
Interim development rept. for 1 Sep-31 Dec 62,
by Theodore Matley. 1 Feb 63, 86p
Contract NObsr87542, Proj. SR0080303, Task 9636
Unclassified report

Available copy will not permit fully legible reproduction. See also AD-402 656.

Descriptors: (*Resistors, Metal films), Porous materials, Miniature electronic equipment, Encapsulation, Electrical properties, Glass, Processing, Electrodeposition.

Work on improving metal film deposition continued. Fixtures and techniques for grinding and slicing the substrates were developed. Resistors were made using metallized glass beads. These resistors and the porous substrate resistors were checked for resistance readings. Additional tests were performed on resistors such as effect of load, termination, encapsulation, electrical noise and mechanical adjustment to resistance value. (Author)

AD-401 296 Field 9A, 20L
CFSTI Price: HC$1.00

Texas Univ., Austin. Electronic Materials Research Lab.
SUPERCONDUCTIVE FREQUENCY CONTROL DEVICES.
Quarterly rept. no. 2, 1 Oct-31 Dec 62, by William H. Hartwig. 31 Dec 62, 25p
Rept. no. EMRL-121
Contract DA36 039AMC00036E

Unclassified report

Descriptors: (*Tuned circuits, Superconductivity), (*Superconductivity, Tuned circuits), Frequency, Control systems, Resonators, Superconductors, Waveguides, Metal films, Lead alloys, Tin alloys, Cryogenics, Electrical properties.

Research continued on developing superconductive, tunable, frequency control devices. Experimental apparatus was assembled and calibration was begun. An improved system for measuring Q at greatly reduced coupling was assembled incorporating a very sensitive receiver. Components were fabricated to permit precise control of temperature in the dewar with provisions for more accurate coupling variation. Theoretical work on the effects of an external magnetic field continued. Measurements are explained in terms of the intermediate state of hollow superconducting cylinders. Studies of inductance calculation proceeded to the point where the solution for a coaxial inductor in a closed cylindrical shield was obtained. The geometry is for current strips of zero thickness.

AD-409 422 Field 9A, 11F
CFSTI Price: HC$4.00

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
THIN FILMS FORMED BY ELECTROCHEMICAL REACTIONS.
Final rept. for 1 Jun 61-31 Jan 63, by E. R. Bowerman, J. Warren Culp, and P. F. Hudock. 31 Jan 63, 132p Rept. no. TR-63-205-3
Contract DA36 039sc90744, Projs. 3A99 15 003, 3G93 34 001

Unclassified report

Continuation of Contract DA36 039sc87305.
Available copy will not permit fully legible reproduction.

Descriptors: (*Capacitors, Metal films), (*Resistors, Metal films), (*Metal films, Electrochemistry), Chemical reactions, Oxidation, Glass, Cleaning, Evaporation, Electron bombardment, Electrolytes, Temperature, Resistance(Electrical), Measurement, Aluminum, Tantalum, Titanium, Zirconium.

The technique of forming thin-film capacitors by the anodic oxidation of the surfaces of vacuum-deposited films of aluminum, tantalum, tungsten, titanium and zirconium has been investigated. Breakdown voltages equal to or greater than the anodization forming voltage have been obtained, resulting in a usable capacitance-voltage product of 13.5 microfarad v/sq cm. The uniformity of capacitance measured for a large number of test samples fell within a standard deviation of 3 percent. Electrical properties over a range of frequency and temperature have been evaluated. The preparation of thin-film resistors by forming vacuum-deposited metal in a predetermined pattern and then partially anodizing the deposited metal to a precise resistance has been studied for tantalum and tungsten. The properties of vacuum-deposited films of titanium and zirconium that are related to their use as resistors has also been investigated. (Author)

AD-433 627 Field 9A
CFSTI Prices: HC$2.00

Westinghouse Electric Corp., Youngwood, Pa. Semiconductor Div.
THERMOELECTRIC TEMPERATURE CONTROL FOR QUARTZ CRYSTALS AND CRYSTAL OSCILLATORS.
Quarterly rept. no. 2, 1 Jul-1Oct 61. 1 Oct 61, 39p
Contract DA36 039SC87190

Unclassified report

Descriptors: (*Quartz, Thermoelectricity), (*Crystal oscillators, Thermoelectricity), (*Thermoelectricity, Temperature control), Modules(Electronic), Stabilization, Circuits, Transistors, Germanium, Control systems, Temperature, Experimental data, Heat transfer, Thermocouples, Inverters, Rectifiers.

The input current is one of the primary parameters in the application of a thermoelectric temperature control chamber for crystal oscillators. It is shown that the practical operating input current range for most thermoelectric chamber designs is principally dependent on the area/length ratio of the n and p arms of one of the couples used in the design. The effects of the input current characteristics on the heat pumping performance and temperature control of a chamber are described for the cooling and heating cycles. An experimental analysis of the heat pumping performance for a single stage thermoelectric chamber utilizing a pyrex dewar flask as the innercore enclosure has been started. Test data of the second chamber with natural convection of the fins at zero watt load has been obtained at several ambient temperatures. Results of the heat pumping performance of the second chamber was compared with that of the first experimental chamber. (Author)

CAPE-1058 Field 9E, 9A

California Univ., Berkeley. Lawrence Radiation Lab.
10-MEGACYCLE SCALER.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Scalers, Mechanical drawings), Printed circuits, Discriminators.

Includes 24 drawings. The 10-Mc scaler with serial and readout facilities has: 23 printed circuit boards, including a discriminator; twelve 10-Mc decade scalers; 2 scan gates and a master scan gate; a Nixie decoder and gate, which is a decimal visual indication used to show the contents of any scaler; a station control; a sequence generator; a binary, 16-output decimal decoder; a program card; and a miscellaneous card. The chassis is constructed of 14GA (0.064) Al, and is approximately 16 x 11 x 7 in. (For details, see TID-4100.) (AEC Abstract)

CAPE-1115 Field 9C

Brookhaven National Lab., Upton, N. Y.
RESISTANCE BRIDGES.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Electric bridges, Resistance(Electrical)), Mechanical drawings, Thermometers, Extremely low frequency, Cryostats, Phase detectors, Transistors, Amplifiers, Transformers, Resistors.

Resistance bridges were designed for low-temperature resistance thermometers. They operate at 30 cps. The 30 cps waveform was derived by dividing the line frequency by two with a binary scaler so that the resultant waveform was perfectly symmetrical with no even harmonics. Preceeding the meter circuit is a phase sensitive detector, which is synchronized by the symmetrical waveform and is sensitive only at 30 cps and at its odd harmonics. The amplifier input circuit consists of a well-shielded, step-up transformer and a high-input impedance field-effect transistor. The amplifier includes a stage tuned to 30 cps and a 60-cps rejection filter to prevent overload on noise and pickup before the phase detector. One bridge is used for measuring two terminal resistors in the 10 ohm and above range. The other bridge, which has a four-terminal configuration is preferred when the resistance of the leads to the resistor in the cryostat is a significant part of the total. (For details see TID-4100.) 2 drawings. (AEC Abstract)

Patent 3,178,864 Field 9A

PREPARATION OF GLASS CELLS CONTAINING HELIUM OF HIGH PURITY.
Patent assigned to Navy,
by Harold W. Anderson, deceased. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Helium, Electron tubes), (*Electron tubes, Helium), Patents.

The process is for producing cells of ultrahigh purity helium which have a long useful operating life and produce a greater signal output in use. Apparatus is provided for creating a high vacuum, for diffusing helium through a heated fused silica tube, for freeing adsorbed and absorbed impurities from the cells by a microwave discharge, and for pumping by titanium gettering of the freed impurities.

Patent 3,179,826 Field 9A, 13H

PIEZOELECTRIC ASSEMBLY.
Patent assigned to Navy,
by Winfield James Trott and William E. Radford.
20 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Piezoelectric crystals, Electroacoustic transducers), Electromechanical converters, Mercury alloys, Silver alloys, Adhesives, Patents.

The piezoelectric assembly includes a plurality of electromechanically responsive elements assembled face to face. The elements have electroded face surfaces and are joined to each other through these surfaces by an amalgam of mercury with silver. Electrical leads are provided between the elements.

Patent 3,179,848 Field 9A

LATERAL-CURRENT CONTROL OF COLD-CATHODE DISCHARGE DEVICES.
Patent assigned to Army,
by Donald J. Belknap and Lloyd R. Crump. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Cold cathode tubes, Current regulators), (*Current regulators, Discharge tubes), Switching circuits, Trigger circuits, Relaxation oscillators, Amplifiers, Electrodes, Gas discharges, Patents.

The cold-cathode device differentiates and amplifies an applied signal. It can be used as a combined amplifier and switching device. The tube has two main discharge electrodes within the envelope. The structure also includes an internal control electrode placed within the envelope in a weak electric field region. Current signals are applied to the control electrode to cause switching between at least two regions.

Patent 3,181,004 Field 9B, 9A

BINARY MEMORY DEVICE EMPLOYING FLIP-FLOP THAT IS CONTROLLED BY IN-PHASE DRIVERS.
Patent assigned to AEC,
by Henry Guckel. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Digital computers, Relaxation oscillators), (*Data storage systems, Digital computers), Transistors, Diodes, Resistors, Gates (Circuits), Patents.

The binary memory element is used in a digital computer. The circuit for information storage does not require the most expensive transistors. The circuitry includes a number of transistors, diodes and resistance elements.

Patent 3,181,008 Field 9A

AMPLITUDE SENSITIVE PEAK SIGNAL SELECTOR WITH COMPENSATING MEANS.
Patent assigned to Navy,
by Charles E. Huckins. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Channel selectors, Circuits), (*Filters-(Electromagnetic wave), Circuits), Transistors, Switching circuits, Patents.

The transistor peak selection circuit selects the strongest signal from several input signals and permits only that signal to pass to an output. The circuit provides any compensation necessary to maintain the output signal at the true amplitude of the selected input signal. The signal having the greatest amplitude is selected from a group of signals which are individually applied to input transistors.

Patent 3,181,013 Field 9A

SOLID-STATE TWO STAGE BOXCAR CIRCUIT EMPLOYED AS A PULSE STRETCHER.
Patent assigned to Navy,
by Paul E. Harris. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Circuits, Transistors), Switching circuits, Gates(Circuits), Coupling circuits, Diodes, Patents.

The solid state boxcar circuit is used in radar applications. A two-stage boxcar circuit is utilized in which the second-stage isolator utilizes feedback, A.C. coupling and bootstrapping techniques to achieve a high input impedance, and the first-stage switch employs diodes with a short recovery time to prevent degradation of the stored signal.

Patent 3,181,044 Field 9A

CAPACITOR MOUNT.
Patent assigned to Army,
by William C. W. Duncan. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Capacitors, Mounting brackets), (*Mounting brackets, Capacitors), Springs, Patents.

The capacitor mount permits easy insertion and withdrawal of a capacitor from an electrical assembly. The mounting consists essentially of two electrically conductive mounting and securing elements, namely an outer and inner spring. The outer spring is in the form of an open-ended tube with a longitudinal gap or slot. The inner mounting element is in the form of a banana spring.

Patent 3,181,048 Field 9E

MOTOR DRIVE SYSTEM FOR A CONTROL CIRCUIT.
Patent assigned to Navy,
by John A. Ficek and Francis A. Wissel. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Circuits, Control), (*Drives, Switching circuits), Control systems, Noise, Fire safety, Guided missiles, Power supplies, Semiconductors, Engines + motors, Patents.

The drive system eliminates the arcing of switches and provides a reduction in noise generation and fire hazards in missiles. The power source is cut off from the control circuit before the control circuit switch is actuated. After the power source is removed from the motor drive the stored energy in the field of the motor is used to continue the motor drive for the completion of the switching action. The motor circuit switch can be opened after about sixty percent of the total drive travel and the stored field energy is dissipated in the correct direction to continue the torque on the drive motor. A semiconductor branch is shunted across the field winding of the motor drive, and the energy in the field winding that would produce arcing is bypassed through the semiconductor branch in the proper direction to continue the motor drive force.

Patent 3,182,208 Field 9A, 18D, 9B

LINEAR GATE WITH GATING PULSES APPLIED TO COLLECTOR THROUGH THE PRIMARY OF A TRANSFORMER.
Patent assigned to AEC,
by Joachim Fischer, William A. Higinbotham, and Robert Lloyd Chase. 4 May 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Gates(Circuits), Switching circuits), Transformers, Transistors, Radiation measurement systems, Coincidence counting, Computer logic, Patents.

The gate circuit is adapted for use where a fast linear gate is required to transmit a signal from an input to an output when a second electronic signal is applied and which behaves as an open circuit in the absence of this second or gate signal. One such application is in the detection of radiation from a target exposed to high speed charged particles from a high energy accelerator such as the Brookhaven Cosmotron. In this case the linear gate is useful in handling the input signals from radiation detectors to give information on the locations of specific ionizations and an indication of the specific ionization of one or two simultaneous particles traversing a hodoscope. As is well known, a hodoscope is an array of detectors which observes trajectories such as the specific ionization of secondary particles knocked out of a target.

Patent 3,182,221 Field 9A

SECONDARY EMISSION MULTIPLIER STRUCTURE.
Patent assigned to Air Force,
by Edmund W. Poor, Jr. 4 May 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Electron multipliers, Secondary emission), Electron tubes, Image intensifiers-(Electronics), Image tubes, Patents.

The secondary emission multiplier structure is for use in electron tubes wherein there is an electron-optical image, such as image intensifier tubes. The structure consists of a plurality of plates or sheets of material each having a number of tapered conical shaped holes arranged in identical patterns with the adjacent sheets displaced laterally with respect to each other so that the holes are alternately staggered first to one side and then to the other. With this arrangement the electrons from the wall of one hole in the one stage will strike the wall of only one hole in the succeeding stages.

Patent 3,182,251 Field 9C, 14B

RELAY INDICATING AND TESTING CIRCUIT.
Patent assigned to Navy,
by Richard J. Fiedler. 4 May 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Relays, Test equipment), (*Test equipment, Relays), Electric switches, Patents.

The relay-controlled indicator circuit is for monitoring the operation of a remotely located electro-mechanical device and for simultaneously giving an indication in the event of faulty operation of the device and/or defect in the indicator circuit. The circuit is shown in combination with a stepper motor. All the relays are caused to operate except the one relay corresponding to the condition selected by the operator. In this manner the operability of all of the relays except one is determined whereas in the past only the one relay which should be energized could be checked.

Patent 3,182,259 Field 9C, 9A

SUBMODULATION SYSTEMS FOR CARRIER RECREATION AND DOPPLER CORRECTION IN SINGLE-SIDEBAND ZERO-CARRIER COMMUNICATIONS.
Patent assigned to Air Force,
by Floyd P. Holder. 4 May 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Modulators, Single sideband communication systems), Frequency multipliers, Frequency dividers, Oscillators, Limiters, Amplitude modulation, Frequency modulation, Patents.

The submodulation system involves a form of duplexing and makes use of a constant-level modulation system. The phase and frequency variations of the transmitted variations of the transmitted signal carry the intelligence, and the amplitude variations contain the information about the frequency of the missing carrier. A receiver is also disclosed for receiving the signal which is channeled into two paths.

Patent 3,182,263 Field 9C, 9E

DIVERSITY RECEPTION SYSTEM WITH CORRECTION FOR LONG-TERM FLUCTUATIONS IN SIGNAL STRENGTH.
Patent assigned to Army,
by William H. Gossard. 4 May 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Diversity reception, Stabilization systems), Antennas, Relaxation oscillators, Gates(Circuits), Patents.

The diversity reception system includes a plurality of antennas and a communication receiver. Components are provided for connecting one of the antennas to the receiver at any given time and elements are energized by the receiver output for controlling the antenna connectors and for determining which signal is to be applied to the receiver. Compensation is made for long-term perturbations in the signal applied to the receiver.

PB-167 562 Field 9B, 12A, 5G
CFSTI Prices: HC$1.00 MF$0.50

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
RESEARCH ON MECHANICAL LANGUAGES AND THEIR AUTOMATIC TRANSLATORS.
Final rept. for 1 Sep 62-30 Sep 64,
by Saul Gorn. 30 Sep 64, 14p
Grant NSF GP95
Unclassified report

Rept. on Mechanical Languages Projects.

Descriptors: (*Computers, Language), (*Data processing systems, Language), (*Programming languages, Scientific research), Programming languages, Coding, Machine translation.

Listings are given of personnel who worked on the projects, the papers published and presented (with abstracts of some), the work in progress and areas for further study, and conferences attended and public lectures given.

PB-167 621 Field 9E, 18F
CFSTI Prices: HC$2.00 MF$0.50

Admiral Corp., Chicago, Ill.
EFFECTS OF NUCLEAR RADIATION ON FREQUENCY CONTROL DEVICES.
Quarterly progress rept. no. 2, 1 Dec 62-28 Feb 63,
by B. Gerstein, A. Fueyo, and F. Trainor. 31 Mar 63,
45p Rept. no. G3988-Q2-1
Contract DA36 039AMC00002E
AD 417 933
Unclassified report

Descriptors: (*Phase control devices, Radiation damage), (*Radiation damage, Phase control devices), Frequency, Control systems, Phase detectors, Transients, Quartz, Crystal oscillators, Crystal ovens.

The development of a system for detection of small transient phase angle changes in quartz crystal units exposed to simulated nuclear weapons environment (SPRF) is described. The detection of phase angle change will be made by comparing the signal to itself with the reference signal being delayed by 300 micro sec. An oscilloscope with a differential amplifier is used for display so that a photographic record can be made. Calibration of the system is accomplished by inserting fixed increments of delay corresponding to known phase angle changes. A thermostatically controlled oven will be used for the moderate precision type of crystal units while a high-quality oven with self-contained, transistorized proportional amplifier will be used for the ageing tests on the precision type crystal units in the laboratory. Circuitry is being designed and tested for remote control of oven temperature; the oven itself will contain only the heater, sensor, and crystal. Details of mechanical mounting of crystal units for rapid interchangeability during reactor experiments are given. A description of the proposed setup for the experiments at Sandia Pulsed Reactor Facility (SPRF) is included. (Author)

PB-167 622 Field 9E, 20L
CFSTI Prices: HC$3.00 MF$0.75

Texas Univ., Austin. Electronic Materials Research Lab.
SUPERCONDUCTIVE FREQUENCY CONTROL DEVICES.
Quarterly rept. no. 3, 1 Jan-31 Mar 63,
by William H. Hartwig. 31 Mar 63, 58p
Rept. no. EMRL-122
Contract DA36 039AMC00036E
AD 411 961
Unclassified report

Descriptors: (*Frequency, Control systems), (*Tuned circuits, Superconductors), (*Superconductors, Tuned circuits), Superconductivity, Metal films, Electrical impedance, Lead alloys, Nickel alloys, Tin, Foils.

Research was continued on development of superconductive frequency control devices. The active experimental program began at 21 mc with tunable circuits capable of being operated immersed or evacuated. Construction of an rf amplifier continued. Several thin-film circuits were successfully deposited. In parallel a technique for building foil circuits of tin, lead, tin-lead alloys, niobium, tantalum and vanadium was developed. Theoretical studies continued on the transfer function of an oscillator incorporating one or two coupling probes at the tank. Calculation of inductance is nearing completion. Comparison between experimental residual resistance measurements and theory are discussed.

PB-167 651 Field 9B
CFSTI Prices: HC$2.00 MF$0.50

Sylvania Electronic Systems, Needham, Mass. Data Systems Operations.
MOBILE DIGITAL COMPUTER PROGRAM, MOBIDIC B.
Quarterly progress rept. no. 7, 1 Jan-30 Jun 60,
by E. W. Jervis, Jr. 30 Aug 60, 30p
Rept. no. Q53-7N

Contract DA36 039SC78050, Proj. 3 58 02 401
AD 253 923

Unclassified report

See also AD-167 652.

Descriptors: (*Digital computers, Armed forces supplies), Mobile, Data processing systems, Design, Circuits, Electronic equipment, Memory, Computer storage devices, Magnetic tape, Punched tape, Disk recording systems.

Progress is reported concerning the developments made in the design and fabrication of the consoles, central processor, in-out converters, data retrieval unit, paper tape unit, and magnetic tape units. The mechanization of multiply round and shift left long is shown, and the disc file is described.

PB-167 652 Field 9B
CFSTI Prices: HC$4.00 MF$0.75

Sylvania Electronic Systems, Needham, Mass. Data Systems Operations.
MOBILE DIGITAL COMPUTER PROGRAM, MOBIDIC B.
Quarterly progress rept. no. 7, add., 1 Jan-30 Jun 60,
by E. W. Jervis, Jr. 7 Dec 60, 105p
Rept. no. Q53-7(add.)N
Contract DA36 039sc78050, Proj. 3 58 02 401
AD 256 160

Unclassified report

See also AD-167 651.

Descriptors: (*Digital computers, Armed forces supplies), Mobile, Data processing systems, Design, Circuits, Electronic equipment, Memory, Computer storage devices, Trailers.

This addendum contains descriptions of three mechanized instructions (multiply, multiply and round, shift left long) and their mechanization, a description of the mass memory and mass memory control unit (including the mass memory address register), and a description of the mass memory controls and indicators in the van and remote truck.

PB-167 677 Field 9A
CFSTI Prices: HC$1.00 MF$0.50

Army Signal Research and Development Lab., Fort Monmouth, N. J.
TEMPERATURE DEPENDENCE OF TUNNEL OR ESAKI DIODES,
by Max Schuller. Jul 60, 24p ASRDL-TR-2156
Task 3A99 21 001 01
AD 246 078

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Tunnel diodes, Temperature), Germanium, Germanium alloys, Arsenic alloys, Direct current, Conductance, Stability, Negative resistance circuits, Amplifiers.

The dc characteristic and negative conductance of germanium and gallium-arsenide tunnel diodes have been measured in the 25C to 100C temperature range. These devices have been used as active components in studying the stability of a negative-resistance amplifier. As a result of this investigation, the use of these devices as stable amplifiers is questionable. (Author)

PB-167 808 Field 9A
CFSTI Prices: HC$2.00 MF$0.50

Cornell Univ., Ithaca, N. Y.
A TUNNEL DIODE OSCILLATOR FOR LOW TEMPERATURE RESEARCH.
Master's thesis,
by Otfried Willibald Georg Heybey. Sep 62, 44p
Grant NSF G22034P

Unclassified report

Descriptors: (*Oscillators, Tunnel diodes), (*Low-temperature research, Oscillators), (*Tunnel diodes, Oscillators), Stability, Design, Cryogenics.

A simple oscillator, utilizing a tunnel (Esaki) diode as the active element, has been designed to operate at temperatures of about 1 K. The oscillator has the frequency stability and the low power dissipation to make it useful for low temperature research. All parts of the oscillator except the bias supply for the diode are at liquid helium temperatures. The advantage of having most of the oscillator at low temperatures is that it is possible to maintain a reasonably constant temperature and to minimize electrical problems by keeping all leads carrying r. f. oscillations as short as possible. At the same time the effect of one lead, besides the ground, necessary to bring power down to the oscillator and to allow one to measure the frequency can be made negligibly small.

PB-167 813 Field 9B, 7D, 20F
CFSTI Prices: HC$2.00 MF$0.50

Naval Radiological Defense Lab., San Francisco, Calif.
A FAST, PUNCHED-CARD READOUT SYSTEM FOR PULSE-HEIGHT ANALYZERS,
by B. A. Euler, P. L. Phelps, and D. F. Covell.
16 Jun 64, 40p USNRDL-TR-775
AD 450 634

Unclassified report

Descriptors: (*Pulse height analyzers, Digital computers), (*Programming(Computers), Gamma-ray spectra), (*Gamma-ray spectra, Scintillation counters), Data processing systems, Input-output devices, Punched cards, Measurement, Gamma-ray spectroscopy, Pulse analyzers, Control systems, Reading machines.

The application of digital computer techniques to the analysis of pulse height spectra is one of the important areas of development of gamma-ray scintillation spectrometry. As a result, an increasing interest has developed in techniques for coupling the pulse height analyzer to the computer. An IBM-523 Gang Summary Punch, in conjunction with a specially built buffer unit is used to provide punched card readout from a 256-channel pulse height analyzer. Complete readout is accomplished in 12 seconds. The use of punched cards contributes the additional advantages of an easily organized data file and ready accessibility to the data. The card-punch buffer unit is capable of converting binary-coded decimal notation (BCD) to binary notation. It has an eight-word AND gate matrix which allows the insertion of seven record-identification and information words into the punch card readout, along with the 256 words of pulse height data. (Author)

UCRL-11222 Field 9C
CFSTI Prices: HC$3.00 MF$0.75

Lawrence Radiation Lab., Univ. of California, Berkeley.
FORTRAN PROGRAM SUMX,
by Lynn Champomier. 15 Apr 64, 74p
N64-33147
Contract W-7405-eng-48

Unclassified report

Descriptors: (*Programming languages, Communication theory), (*Programming(Computers), Input-output devices).

10. Energy Conversion (Non-propulsive)

AD-418 246 Field 10A, 11I, 7D
CFSTI Price: HC$2.00

Polytechnic Inst. of Brooklyn, N. Y.
ION-EXCHANGE MEMBRANE ELECTROLYTES.
Quarterly progress rept. no. 5, 1 Mar-31 May 63,
by H. P. Gregor, R. M. Danziger, and R. A. Cooper.
31 May 63, 30p
Contract DA36 039sc89197, Task 3A99 09 001 02
Unclassified report

Descriptors: (*Fuel cells, Ion exchange resins), (*Ion exchange resins, Synthesis(Chemistry)), (*Membranes, Preparation), Electrolytes, Styrene plastics, Sulfonic acids, Polymerization, Epoxy resins, Electrolytic cells, Electroosmosis, Transport properties, Vinyl plastics, Aromatic compounds, Electrochemistry.

Additional progress (see AD-405 609) was made in the preparation of low resistance homogeneous membranes, using polystyrene sulfonic acid as the polyelectrolyte through the use of epoxide and divinyl benzene-styrene cross-linking agents. Numerous mosaic membranes were synthesized and their electro-osmotic water transport characteristics evaluated. (Author)

AD-447 190 Field 10C
CFSTI Price: HC$3.00

Eagle-Picher Co., Joplin, Mo.
RESEARCH ON AMMONIA BATTERY SYSTEM.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 64,
by D. J. Doan, L.R. Wood, and Leroy Folks.
30 Apr 64, 62p Rept. no. R-15
Contract DA36 039AMC02173E, Proj. 1G6 22001A053 02
Unclassified report

Continuation of Contract DA36 039sc89188. See also AD-402 683.

Descriptors: (*Storage batteries, Ammonia), Performance(Engineering), Design, Electrolytes, Anodes, Effectiveness.

Fractional factorial studies were continued simultaneously with miscellaneous single cell tests. The primary objective was to improve cell design (increase energy density) and to elucidate problems concerning high temperature (+125F) performance. Considerable data were collected and a more comprehensive knowledge of the influence of design variables is available. More complete data are also available concerning the capability of cells developed to date. (Author)

Patent 3,181,848 Field 10C, 10B, 13J

AMALGAM REGENERATOR FOR PRIMARY BATTERY SYSTEM.
Patent assigned to Navy,
by Kenneth D. Miller, Jr. 4 May 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Submarines, Batteries + components), (*Batteries + components, Submarines), (*Sodium alloys, Mercury alloys), (*Mercury alloys, Sodium alloys), Fuel cells, Patents.

The battery system is designed for submarine use to supplement the main power system or for propulsion of the vessel. The regeneration apparatus is designed for use under conditions of extreme roll and pitch. Controlled amounts of sodium are mixed with sodium amalgam which is recirculated in a primary battery system in order to regenerate the amalgam to a desired sodium concentration.

PB-167 612 Field 10A
CFSTI Prices: HC$2.00 MF$0.50

Engelhard Industries, Inc., East Newark, N. J.
HYDROGEN GENERATION FOR FUEL CELLS.
Quarterly rept. no. 7, 1 Nov 63-31 Jan 64,
by E. J. Emerson, L. E. Goodman, and H. H. Geissler.
31 Jan 64, 27p
Contract DA36 039sc89077, Task 1G6 22001A053 04
AD 438 850
Unclassified report

Descriptors: (*Fuel cells, Hydrogen), (*Hydrogen, Production), Ammonia, Hydrocarbons, Jet engine fuels, Electric power production, Military requirements, Portable.

Life testing of the ammonia fuel prototype hydrogen generating device, Pt-6, was completed. A total of 87 cycles with an accumulated operating time of 1035 hours were accomplished before a failure occurred. The design study of a liquid hydrocarbon fueled hydrogen generator at the 500 watt (10 SCFH) level was completed. The study is an extension of the 200 watt (4 SCFH) generator study previously reported. Major changes include the substitution of a feed system employing air pressurization, with a readily replaceable vaporizer, for the steam boiler pressurization system reported previously. It was determined that a generator of 10 SCFH capacity could be designed for a two-hour mission with an estimated dry weight of 25 pounds and would require 3 pounds of fuel and water, while a unit designed for a ten hour mission would weigh 30 pounds dry and require 15 pounds of fuel and water. Life testing with JP-4 jet fuel indicates that by restricting the sulfur content to levels which presently exist in some commerically available fuels, this fuel can be steam reformed successfully for a reasonable period of time. (Author)

11. Materials

DP-860 (Vol. I) Field 11F
CFSTI Prices: HC$6.00 MF$1.25

Du Pont De Nemours (E. I.) and Co., Aiken, S. C.
Savannah River Lab.
STAINLESS STEEL INFORMATION MANUAL FOR THE SAVANNAH RIVER PLANT. VOL. I. PROPERTIES,
comp. by W. C. Rion, Jr. Jul 64, 211p
Unclassified report

Descriptors: (*Stainless steel, Mechanical properties), (*Corrosion-resistant alloys, Stainless steel).

N65-17457 Field 11F
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
GRAIN GROWTH IN DILUTE TUNGSTEN-BORON ALLOYS,
by Peter L. Raffo and Robert F. Hehemann.
Mar 65, 23p NASA-TN-D-2649 Unclassified report

Research done in cooperation with the Case Inst. of Tech., Cleveland, Ohio.

Descriptors: (*Tungsten alloys, Grain structures-(Metallurgy)), (*Boron alloys, Grain structures-(Metallurgy)).

N65-17965 Field 11B, 7E
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
EFFECTS OF 1.2 AND 0.30 MEV ELECTRONS ON THE OPTICAL TRANSMISSION PROPERTIES OF SEVERAL TRANSPARENT MATERIALS,
by Gilbert A. Haynes and William E. Miller.
Mar 65, 32p NASA-TN-D-2620
Unclassified report

Descriptors: (*Glass, Optical properties), (*Quartz, Radiation damage).

N65-19904 Field 11D, 22D
CFSTI Prices: HC$5.00 MF$1.00

National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
SEALED-FOAM, CONSTRICTIVE-WRAPPED, EXTERNAL INSULATION SYSTEM FOR LIQUID-HYDROGEN TANKS OF BOOST VEHICLES,
Mar 65, 157p NASA-TN-D-2685
Unclassified report

Descriptors: (*Thermal insulation, Propellant tanks), (*Propellant tanks, Launch vehicles(Aerospace)).

N65-19914 Field 11F, 7E
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DAMAGE TO GERMANIUM DUE TO 22 AND 40 MeV PROTON BOMBARDMENTS,
by Roger A. Breckenridge and Chris Gross.
Mar 65, 18p NASA-TN D-2727
Unclassified report

Descriptors: (*Germanium, Radiation damage), Proton bombardment.

Patent 3,178,367 Field 11H

METHOD OF PREPARING FINELY DIVIDED SOLID METAL SALTS.
Patent assigned to Esso Research and Engineering Co.,
by Alan S. Dubin and Jerome Panzer. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Corrosion inhibition), Lubricants, Greases, Salts, Fatty acids, Solutions, Alkali metal compounds, Alkaline earth compounds, Surface-active substances, Calcium compounds, Acetates, Pyridines, Colloids, Gelatins, Patents.

Finely divided metal salts, such as calcium acetate, are added to lubricating oils and greases to provide rust preventions, oxidation inhibition, etc. The metal salt is of an acid selected from the group consisting of C2 to C4 fatty acids and inorganic mineral acids. A solution is made from the salt and a solvent; then a second solvent, miscible with the first solvent but in which the salt is insoluble, is added to cause the salt to precipitate. The mixture is then added to a lubricating oil, and the solvents are removed.

Patent 3,178,368 Field 11H

PROCESS FOR BASIC SULFURIZED METAL PHENATES.
Patent assigned to California Research Corporation,
by Walter W. Hanneman. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Preparation), Cleaning compounds, Alkaline earth compounds, Phenols, Salts, Sulfur compounds, Calcium compounds, Sulfonates, Carbonates, Hydroxides, Lubricants, Diesel engines, Lubrication, Patents.

Sulfurized calcium carbonated alkyl phenate containing excessive amounts of metal is incorporated in diesel engine lubricating oil as a detergent and neutralizing agent for oxidation products of the oil and fuel residues. An alkyl phenol, having from 4 to 30 carbon atoms in the alkyl radical, is reacted with calcium hydroxide and sulfur, and then carbonated in a blend of a base oil, calcium alkyl aryl sulfonate, an aliphatic monohydric alcohol of from 8 to 18 carbon atoms, and ethylene glycol. The alkyl radical of the phenol component is derived from polypropylene having an average of 12 carbon atoms. The calcium mahogany petroleum sulfonate, from 0.01 to 0.05 mol per mol of phenol, and 50 percent of the original charge of from 10 to 50 percent by weight of phenol of the monohydric alchol remain in the composition, while the water of reaction and ethylene glycol are removed by heating.

Patent 3,179,514 Field 11F

UPGRADING PRIMARY MANGANESE MATTE.
Patent assigned to Interior,
by Ralph C. Kirby. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Refining(Metallurgy), Manganese), (*Manganese, Refining(Metallurgy)), Iron compounds, Sulfides, Oxidation, Patents, Manganese compounds.

The method is for refining primary manganese matte consisting of manganese sulfide and iron sulfide. The molten primary matte is treated with an oxidizing gas from the group consisting of air and oxygen and a reducing agent from the group consisting of coke, coal and natural gas to form two separate liquid phases consisting of molten refined manganese matte as one phase and molten iron metal as the second phase. The two phases are separated to recover the refined manganese matte.

Patent 3,179,591 Field 11H

LUBRICATING COMPOSITIONS.
Patent assigned to Shell Oil Co., New York,
by Stephen A. Herbert, Jr. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Preparation), Corrosion inhibition, Cleaning compounds, Lubricants, Mineral oils, Polymers, Pyridines, Vinyl plastics, Acrylic resins, Alcohols, Thiols, Patents.

A corrosion inhibiting and detergent additive for mineral lubricating oils consists of a polyalkyl hydroxybenzyl alcohol and a copolymer of a vinyl nitrogen-bearing compound and a methacrylate of a long chain fatty acid. A vinyl substituted heterocyclic nitrogen-containing substance such as 2-methyl-5-vinyl pyridine is reduced, in the presence of ammonia, with an acrylate or methacrylate of stearic and/or lauric acid. The alcohol, or a polyalkyl hydroxybenzyl mercaptan, is a 3,5-dialkyl-4-hydroxybenzyl alcohol compound. Each component of the detergent composition constitutes from 0.5 to 6 percent by weight of the oil base. The lubricant is particularly suitable for aviation and automotive uses.

Patent 3,179,597 Field 11C, 11K

VERTICAL ADHERENCE PAINT REMOVER COMPOSITIONS.
Patent assigned to Army,
by Abraham Mankowich. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Paint removers, Gels), Sodium compounds, Hydroxides, Glycols, Lawcates, Calcium compounds, Stearates, Water, Patents.

The paint remover is in the form of a thixotropic gel. It contains 7.4 to 9 percent of sodium hydroxide, 13.0 to 17.0 of a glycol such as hexylene glycol, 0.75 to 1.15 percent of a surfactant such as sodium laurate, 1.7 to 3.0 percent of a soap such as calcium stearate and 72.0 to 75.0 percent water.

Patent 3,179,615 Field 11I

DIESTERAMIDE PLASTICIZERS.
Patent assigned to Agriculture,
by Frank C. Magne, Robert R. Mod and Evald L. Skau. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Plasticizers, Amides), Esters, Vinyl plastics, Chlorides, Nitrile rubber, Cellulose acetates, Patents.

The vinyl chloride resin composition is plasticized with N-bis(2-acetoxyethyl)epoxyoleamide. The diester-amides are also efficient plasticizers for cellulose tri-acetate and as softeners for nitrile rubbers.

Patent 3,179,717 Field 11C, 11I, 7C

COATING COMPOSITIONS COMPRISING POLYMERS OF VINYL ETHERS OF POLYUNSATURATED FATTY ALCOHOLS.
Patent assigned to Agriculture,
by Edward J. Dufek, Lyle E. Gast, Howard M. Teeter, Gus C. Mustakas and John C. Cowan. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Coatings, Polymers), (*Films, Polymers), Copolymerization, Ethers, Desiccants, Vegetable oils, Alcohols, Monocyclic compounds, Patents.

The film-forming compositions are useful for application to metal drums, as coatings for alkaline surfaces, and on wood. They are made of toluene solvent, a metallic drier, and an uncrosslinked copolymer consisting of 40 mole percent of a vinyl ether of a conjugated polyunsaturated vegetable oil fatty alcohol and 60 mole percent of cyclopentadiene.

Patent 3,180,832 Field 11H, 21D, 21I

OIL COMPOSITIONS CONTAINING ANTI-WEAR ADDITIVES.
Patent assigned to Esso Research and Engineering Co.,
by Michael J. Furey. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Wear resistance), (*Linoleic acid, Lubricant additives), (*Glycols, Lubricant additives), (*Fuel additives, Oils), Mineral oils, Lubricants, Hydrocarbons, Fuel oils, Jet engine fuels, Liquid rocket fuels, Patents.

Dimers of linoleic acid combined in equimolar amounts with a diol or polyol of from 2 to 50 carbon atoms forms an anti-wear agent for mineral and synthetic lubricating oils. From 0.1 to 2.0 percent of the dimer acid and an alkane diol in molar proportions varying from 0.8 to 1.2 parts of diol per molar proportion of dimer acid in an oil reduces scuffing and valve train wear in internal combustion engines. The alkane diol is a glycol, and may be ethylene glycol, 1,4-butane diol etc. The composition is added to diesel, jet, and rocket fuels to improve lubricity.

Patent 3,180,896 Field 11E

PROCESS FOR TREATING CELLULOSIC TEXTILES WITH FORMALDEHYDE IN VAPOR FORM.
Patent assigned to Agriculture,
by John D. Guthrie. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Textiles, Processing), (*Formaldehyde, Textiles), Vapors, Hydrochloric acid, Powders, Patents.

Wrinkle resistance or 'wash-wear' properties are imparted to cellulosic textiles by the composition. The composition contains 0.5 to 1.2 percent by weight HCl, made by exposing paraformaldehyde powder to vapor from concentrated hydrochloric acid.

Patent 3,181,225 Field 11C, 11E, 11I

PROCESS OF RESIN TREATING A COTTON BATTING.
Patent assigned to Agriculture,
by Nestor B. Knoepfler, Homer K. Gardner, Jr., and Henry L. E. Vix. 4 May 65
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Cotton textiles, Plastic coatings), (*Plastic coatings, Cotton textiles), Mattresses, Vinyl plastics, Cellulose, Fibers, Sprays, Patents, Esters, Cotton, Plastics. Unclassified patent

The fibrous batts are used in the furniture and automotive industries for upholstery, mattresses and automotive cushioning. The web of opened textile fibers of cotton are treated before final forming with a resin. The resin is made of dimethylol ethyl carbamate and vinyl acetate. The resins react, by crosslinking, with the cellulose of the cotton.

Patent 3,182,020 Field 11H

STABILIZED CALCIUM ACETATE OIL DISPERSIONS.
Patent assigned to Socony Mobil Oil Company, Inc., by Robert H. Davis. 4 May 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricants, Colloids), (*Calcium compounds, Acetates), (*Acetates, Lubricant additives), Oils, Greases, Organic nitrogen compounds, Stability, Wear resistance, Heat-resistant materials, Patents.

A lubricating composition is imparted with improved load-carrying ability and anti-wear properties by incorporation of calcium acetate. The composition consists of a base lubricant, 0.1 to 50 percent by weight calcium acetate and 0.01 to 20 percent by weight of N-acyl-substituted sarcosine. The N-acyl-substituted sarcosine acts as a dispersion stabilizer under both normal and extreme temperatures.

Patent 3,183,188 Field 11H

PETROLEUM LUBRICANTS STABILIZED WITH BACTERICIDES.
Patent assigned to Commercial Solvents Corp., New York, by Edward B. Hodge. 11 May 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Germicides), (*Cutting fluids, Additives), (*Hydraulic fluids, Additives), (*Germicides, Lubricant additives), Hydrocarbons, Stabilization, Pyrimidines, Bacteria, Inhibition, Patents.

Nitrohexahydropyrimidines in amounts to 2 weight percent are used as bacteriostatic agents for cutting and core oils, grinding lubricants, and hydraulic fluids. One composition is 1,3,5-trimethyl-5-nitrohexahydropyrimidine, employed in portions from 100 p.p.m. to 1000 p.p.m. The compounds exhibit stability and are intended for general bacterial growth inhibition.

Patent 3,183,190 Field 11H

DISTYRENATED ALKYL AROMATIC HYDROCARBON AS LUBRICANT.
Patent assigned to Socony Mobil Oil Company, Inc., by John W. Schick and Edward A. Oberright. 11 May 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricants, Preparation), (*Heat-resistant materials, Lubricants), Aromatic compounds, Xylenes, Catalysts, Clay, Silicon compounds, Aluminum compounds, Oxides, Jet engines, Rocket motors, Spacecraft, Lubrication, Patents.

Distyrenated alkyl aromatic hydrocarbon provides a lubricant useful at high temperatures such as those produced in jet combustion engines, rockets, missiles and space vehicles. A distyrenated reaction product is obtained by reacting styrene with a lower alkyl benzene in the presence of an acid-treated bentonite non-swelling montmorillonite clay, at a temperature of 135 to 150C. The molar ratio between the hydrocarbon and the styrene is from 1:1 to 1.5:1.

Patent 3,184,408 Field 11H

HIGH TEMPERATURE STABILIZING LUBRICANT ADDITIVE.
Patent assigned to Esso Research and Engineering Co., by Ernest V. Wilson and Harry W. Rudel. 18 May 65
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Heat-resistant materials), (*Phosphates, Lubricant additives), (*Fatty acid esters, Lubricant additives), Lubricants, Cadmium compounds, Phosphoric acids, Stearates, Corrosion inhibition, Acetates, Succinates, Marine engines, Lubrication, Sulfur compounds, Patents.

Trimethytolpropane monoesters are used as an additive in marine turbine oils containing metal dialkyldithiophosphates to stabilize them against thermal degradation and high temperatures. A marine turbine oil contains a lubricating oil, 1 to 3 weight percent of an oil soluble cadmium salt of dialkyldithiophosphoric acid, and 0.05 to 0.5 weight percent of a monoester of a neo-structured trialkylolalkane. The oil may also include 0.005 to 0.5 weight percent of a rust inhibitor consisting of alkyl mercaptoacetic acids.

Patent 3,184,411 Field 11H

LUBRICANTS FOR REDUCING CORROSION.
Patent assigned to California Research Corp., San Francisco, by Warren Lowe. 18 May 65
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Corrosion inhibition), (*Anhydrides, Lubricant additives), (*Amines, Lubricant additives), Lubricants, Oils, Alkenes, Succinates, Polymers, Phosphorus compounds, Sulfides, Diesel engines, Internal combustion engines, Lubrication, Cleaning compounds, Patents.

A metal-free detergent with increased corrosion inhibiting and sludge dispersing characteristics for diesel and gasoline engine lubricating oils is a sulfurized succinic anhydride-polyalkylene polyamine product. An alkenyl succinic anhydride having an alkenyl radical derived from polypropylene or polyisobutene is combined with tetraethylene pentamine at temperatures from 220 to 350 degrees F., and then reacted with phosphorus pentasulfide at temperatures from 275 to 375 degrees F. Mol ratios of succinic anhydride/polyamine range from 0.5 to 1 to 1:1, and ratios of sulfide-polyamine/anhydride are from 1:4 to 1:1. Base compositions may be paraffinic or mineral oils, and contain from 0.1 to 10 weight percent of the additive.

Patent 3,184,413 Field 11H

POLYMERIC LUBRICATING OIL ADDITIVES CONTAINING IODINE AND USES THEREOF.

Patent assigned to Esso Research and Engineering Co., by Michael J. Furey and Philip Zaybekian. 18 May 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Iodine), (*Iodine, Lubricant additives), Lubricants, Polymers, Friction, Pressure, Wear resistance, Oils, Halogenated hydrocarbons, Iodine compounds, Halocarbon plastics, Polyester plastics, Polyvinyl alcohol, Fatty acid esters, Acetates, Anhydrides, Polyethylene plastics, Patents.

Iodine is added to polymer compositions for automotive lubricating oils to improve antifriction, extreme pressure, and anti-wear properties. The additives are oil soluble homopolymers and copolymers formed from olefins containing from 2 to 30 carbon atoms and ethylenically monounsaturated esters having from 4 to 30 carbon atoms, including methacrylates, fumerates, acetates, and vinyl esters. In either gaseous or crystalline form, iodine is combined with the terpolymer of an alkyl fumerate, vinyl acetate, and maleic anhydride in amounts from 10 to 90 weight percent. Lubricating oil compositions are made by dissolving the iodine-treated polymers in a paraffinic oil having a viscosity of 112 SUS at 100 degrees F. so that the final product has an iodine concentration ranging from 0.01 to 0.8 percent by weight.

Patent 3,185,644 Field 11H

LUBRICATING COMPOSITIONS CONTAINING AMINE SALTS OF BORON-CONTAINING COMPOUNDS.
Patent assigned to Texaco Inc., New York,
by Edwin C. Knowles and Edward L. Kay.
25 May 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Borates), (*Boron compounds, Lubricant additives), (*Amines, Lubricant additives), Lubricants, Oils, Pyrolysis, Hydrolysis, Stabilization, Organoboranes, Organic nitrogen compounds, Ammonium compounds, Salts, Jet engines, Turboprop engines, Lubrication, Patents.

A hydrolytically and thermally stable amine composition formed from trialkyl and triaryl borates and a hydroxy substituted amine is a load carrying additive for mineral and synthetic di- and polyester lubricating oils. N,N-diethylaminoethanol, for example, is reacted in equimolar portions with trimethyl borate, and from 0.05 to 5 percent by weight of the resulting composition is added to an oil base having a viscosity from 50 to 2500 Saybolt Universal Seconds at 100 degrees F. The base oils contain polymethacrylate viscosity index improvers, alkyl-aryl silicone anti-foam agents, and phenolic anti-oxidants. The lubricant composition is suitable for reduction and accessory drives of aircraft turbojet and turboprop engines.

Patent 3,185,645 Field 11H

OXIDATION INHIBITED LUBRICANTS.
Patent assigned to California Research Corp., San Francisco,
by James O. Clayton. 25 May 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Corrosion inhibition), (*Amines, Lubricant additives), (*Anhydrides, Lubricant additives), (*Phosphoric acids, Lubricant additives), Lubricants, Oils, Cleaning compounds, Succinates, Sulfur compounds, Polymers, Polyethylene plastics, Internal combustion engines, Diesel engines, Lubrication, Patents.

A metal-free detergent for diesel and gasoline engine lubricating oils is the reaction product of a polyalkylene polyamine, an alkenyl succinic anhydride, and a dihydrocarbyl dithiophosphoric acid. The additive reduces sludge and varnish and inhibits oxidation without the ash formation characteristic of metal containing compounds. The alkenyl radical of the succinic anhydride is derived from propylene, butylene, or n-decenyl polymers of 50 to 200 carbon atoms. The amine compound is a polyethylene or polypropylene polyamine. The mol ratio varies from 0.8 to 1 to 1:1, and the ratio of anhydride to dialkyl or alkylphenyl dithiophosphoric acid ranges from 0.5 to 1 to 1:1, when these are the initial reactants. The temperature of reaction is from 210 to 310 degrees F. From 0.1 to 10 weight percent of the detergent is added to hydrocarbon mineral or synthetic lubricating oils.

Patent 3,185,647 Field 11H

LUBRICANT COMPOSITION.
Patent assigned to California Research Corp., San Francisco,
by Robert G. Anderson and Yngve G. Hendrickson.
25 May 65
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Lubricant additives, Corrosion inhibition), (*Organic nitrogen compounds, Lubricant additives), (*Organic phosphorus compounds, Lubricant additives), (*Amines, Lubricant additives), Lubricants, Oils, Cleaning compounds, Succinates, Phosphorus compounds, Sulfides, Alkenes, Polymers, Polyethylene plastics, Internal combustion engines, Diesel engines, Lubrication, Patents.

The products obtained by reacting an N-alkyl alkenyl succinimide with phosphorus pentasulfide and then with a polyalkylene polyamine are effective as metal-free detergents and corrosion inhibitors when added to lubricating oils for automobiles. From 0.1 to 40 percent by weight of the reaction product is incorporated in lubricating oils. The reactions take place at a temperature between 70 and 450F.

Patent 3,186,946 Field 11H

AQUEOUS CUTTING FLUID.
Patent assigned to Master Chemical Corporation,
by Clyde A. Sluhan. 1 Jun 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Cutting fluids, Preparation), (*Boric acids, Cutting fluids), (*Amines, Cutting fluids), (*Lubricants, Cutting fluids), Benzoates, Corrosion inhibition, pH, Patents.

Boric and benzoic acids are combined with an amine in a water solution to make a cutting fluid for machine parts. Upon evaporation of water the cutting fluids leave a soft residue which is easily removed from machine parts and does not interfere with the operation of a machine tool. The cutting fluid is water and 1/4 to 50 percent by weight of salts of boric and benzoic acids combined with an amine.

PB-167 486 Field 11E
CFSTI Prices: HC$2.00 MF$0.50

Textile Research Inst., Princeton, N. J.
RAPID METHODS FOR DETERMINING THE NON-FIBROUS CONTENT OF COTTON FABRICS.
Final rept. for 8 May 58-15 Jun 59,
by Robert F. Schwenker, Jr., Eugene Pascu, and Rudolph Turner. 30 Sep 59, 45p
Contract DA19 129QM1174

Unclassified report

Descriptors: (*Cotton textiles, Chemical analysis), Waxes, Oils, Separation, Bases(Chemistry), Sodium compounds, Hydroxides, Borohydrides, Enzymes, Cellulose, Fibers(Natural).

The results of a study on the development of new methods for determining the nonfibrous content of cotton fabrics are reported. The standard method now in use (Method 2611.1, Federal Specification CCC-T-191b, Amendment 4, 25 January 1956) is evaluated and improvements designed to reduce application time are recommended. Rapid, new methods based on the use of dilute sodium hydroxide and sodium borohydride solutions are described in detail and recommended to replace Method 2611.1. The time required for the application of the alkali methods is estimated to be only about one-third of the time necessary for the present Method 2611.1. The degradative effect of dilute alkali on cotton cellulose and the mechanism of alkaline attack are discussed. Data are presented on the stabilization of cotton cellulose against alkaline attack by treatment with aqueous sodium borohydride. The nonfibrous contents of four different cotton fabrics were determined and the results are compared with similar results obtained by Method 2611.1. A method for the determination of size content by chemical analysis is also discussed. (Author)

12. Mathematical Sciences

N65-20880 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
A SPECIAL FORM OF A GENERALIZED INVERSE OF AN ARBITRARY COMPLEX MATRIX,
by Henry P. Decell, Jr. Apr 65, 14p
NASA-TN-D-2748

Unclassified report

Descriptors: (*Matrix algebra, Theory).

PB-167 580 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON A THEOREM IN THE SPACE l(1) OF ABSOLUTELY CONVERGENT SERIES WITH APPLICATIONS TO COMPLETELY ADDITIVE SET FUNCTIONS,
by T. H. Hildebrandt. Dec 58, 16p
Technical summary rept. no. MRC-TSR-62
Contract DA11 022ORD2059
AD 210 914

Unclassified report

Descriptors: (*Functional analysis, Theorems), (*Theorems, Functional analysis), Series, Set theory, Sequences.

PB-167 581 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
DISTRIBUTION OF ZERO-SETS OF CONTINUOUS FUNCTIONS,
by R. C. Buck. Aug 58, 10p
Technical summary rept. no. MRC-TSR-36
Contract DA11 022ORD2059
AD 203 817

Unclassified report

Descriptors: (*Set theory, Functions), (*Functions, Set theory), Distribution theory, Functional analysis, Polynomials.

PB-167 587 Field 12A
CFSTI Prices: HC$3.00 MF$0.75

Mathematics Research Center, Univ. of Wisconsin, Madison.
APPROXIMATIONS BY FUNCTIONS OF FEWER VARIABLES,
by Michael Golomb. Oct 58, 55p
Technical summary rept. no. MRC-TSR-50
Contract DA11 022ORD2059
AD 208 050

Unclassified report

Descriptors: (*Numerical analysis, Functions), (*Functions, Numerical analysis), Least squares method, Functional analysis.

PB-167 608 Field 12A
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON THE IRREDUCIBLE REPRESENTATIONS OF CERTAIN LIE ALGEBRAS OF PRIME CHARACTERISTIC,
by Charles W. Curtis. 20 Nov 57, 34p
Technical summary rept. no. MRC-TSR-13
Contract DA11 0220RD2059
AD 160 674

Unclassified report

Descriptors: (*Algebras, Matrix algebra), Transformations(Mathematics), Prime numbers.

PB-167 680 Field 12B, 12A
CFSTI Prices: HC$1.00 MF$0.50

RAND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING: PART XX. MAXIMAL FLOW THROUGH A NETWORK,
by L. R. Ford and D. R. Fulkerson. 19 Nov 54, 16p
Rept. no. RM-1400
AD 90 541

Unclassified report

Available copy will not permit fully legible reproduction. Rept. on Proj. RAND.

Descriptors: (*Linear programming, Networks), (*Networks, Topology), Algebraic topology, Set theory, Inequalities, Graphics.

A proof of the minimal cut theorem is given for a general network. The theorem is applied to obtain a simple computational procedure for finding a maximal flow in planar networks.

PB-167 682 Field 12A
CFSTI Prices: HC$4.00 MF$1.00

Naval Weapons Lab., Dahlgren, Va.
COMPUTING PROGRAMS FOR COMPLEX BESSEL FUNCTIONS,
by A. V. Hershey. 7 Feb 64, 138p NWL-1906
Task R360FR103 2101R0110101
NAVWEPS 8336; AD 445 827

Unclassified report

Descriptors: (*Bessel functions, Programming-(Computers)), (*Programming(Comuters), Bessel functions), Polynomials, Numerical analysis, Tables.

The asymptotic series with converging factor is used in subroutines to evaluate conventional Bessel functions. Rational polynomial approximations are developed for the modified Bessel function of the second kind of orders zero, one third, two thirds, and one. The range of validity of the rational approximations is that part of the complex plane on the positive side which is bounded by the imaginary axis and by a circle of unit radius. Values of the modified Bessel function to thirteen decimal digits are tabulated at unit intervals in the argument. (Author)

PB-167 690 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
LIMIT THEOREMS FOR SEMI-MARKOV PROCESSES, PART II,
by P. M. Anselone. Mar 59, 20p
Technical summary rept. no. MRC-TSR-86
Contract DA11 022ORD2059
AD 215 246

Unclassified report

Descriptors: (*Statistical processes, Measure theory), (*Measure theory, Statistical processes), Probability, Stochastic processes.

PB-167 691 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
A MULTIPLE COMPARISON SIGN TEST: TREATMENTS VERSUS CONTROL,
by Robert G. D. Steel. Mar 59, 22p
Technical summary rept. no. MRC-TSR-83
Contract DA11 022ORD2059
AD 215 247

Unclassified report

Descriptors: (*Statistical tests, Analysis of variance), (*Probability, Statistical distributions), Distribution theory, Tables, Sampling, Control.

A non-parametric sign test for comparing several treatments against a control is presented. The problem of computing exact probabilities and distributions is discussed. An approximation for determining critical values is given. Tables of critical values, based on the approximation, and some exact distributions are included. (Author)

PB-167 692 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
A MULTIPLE COMPARISON RANK SUM TEST: TREATMENTS VERSUS CONTROL,
by Robert G. D. Steel. Mar 59, 16p
Technical summary rept. no. MRC-TSR-82
Contract DA11 0220RD2059
AD 215 248

Unclassified report

Descriptors: (*Statistical tests, Matrix algebra), (*Correlation techniques, Statistical tests), Control, Distribution theory, Probability, Statistical distributions.

A multiple comparison rank sum test, for comparing treatments with a control in a one-way classification with equal numbers of observations, is presented. Both the exact and an approximate distribution are discussed. An example and tables of critical values are given. (Author)

PB-167 693 Field 12A
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
WEAK CONVERGENCE AND COMPACTNESS IN SPACES OF ADDITIVE TYPE FUNCTIONS,
by Pasquale Porcelli. Mar 59, 38p
Technical summary rept. no. MRC-TSR-77
Contract DA11 0220RD2059
AD 215 249

Unclassified report

Descriptors: (*Functional analysis, Sequences), (*Measure theory, Special functions(Mathematical), Algebra, Set theory.

PB-167 718 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
REMARKS ON A CHAPTER OF THE INTEGRAL,
by L. C. Young. May 58, 12p
Technical summary rept. MRC-TSR-27
Contract DA11 0220RD2059
AD 201 711

Unclassified report

Descriptors: (*Integrals, Theory), Real variables, Inequalities, Measure theory, Set theory.

PB-167 719 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
PARTIAL AREA I,
by L. C. Young. May 58, 16p
Technical summary rept. MRC-TSR-28
Contract DA11 0220RD2059
AD 201 712

Unclassified report

Descriptors: (*Integrals, Matrix algebra), (*Geometry, Surfaces), Measure theory, Mapping(Transformations).

PB-167 720 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
PARTIAL AREA II,

by L. C. Young. Jun 58, 21p
Technical summary rept. MRC-TSR-29
Contract DA11 0220RD2059
AD 201 713

Unclassified report

Descriptors: (*Integrals, Matrix algebra), (*Geometry, Surfaces), Mapping(Transformations), Calculus of variations.

PB-167 721 Field 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
PARTIAL AREA III,
by L. C. Young. Jun 58, 11p
Technical summary rept. MRC-TSR-30
Contract DA11 0220RD2059
AD 201 714

Unclassified report

Descriptors: (*Integrals, Matrix algebra), (*Geometry, Surfaces), Measure theory.

PB-167 725 Field 12A
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON THE MATRICES ASSOCIATED WITH MAXWELL'S EQUATIONS,
by C. C. MacDuffee. Jul 58, 29p
Technical summary rept. MRC-TSR-31
Contract DA11 022ORD2059 Unclassified report
AD 203 842

Descriptors: (*Matrix algebra, Partial differential equations), (*Partial differential equations, Matrix algebra), Transformations(Mathematics).

The paper examines these very interesting matrices in more than ordinary detail, particularly their reduction to canonical form under Lorentzian transformations. The results seem to lend support to the thesis (by no means novel) that this problem is best treated within the scope of the real field, and in matric rather than in tensor notation.

13. Mechanical, Industrial, Civil, and Marine Engineering

AD-417 076 Field 13G
CFSTI Price: HC$4.00

Hydraulic Research and Mfg. Co., Burbank, Calif.
STUDY OF A SERVO ACTUATOR DESIGN AND TEST AND FABRICATION OF AN EXPERIMENTAL MODEL.
Final rept.,
by R. T. Banfield and T. Caywood. Jul 63, 147p
Contract AF33 616 7985, Proj. 8225, Task 822503
ASD TDR-62-620

Unclassified report

Descriptors: (*Hydraulic actuators, Hydraulic servomechanisms), (*Hydraulic servomechanisms, Hydraulic actuators), Feedback, Tests, Mechanical drawings, Hydraulic valves, Hydraulic seals, Test equipment, Equations, Temperature, Radiation damage.

A description is presented of work accomplished in the study, design, manufacture and test of a unique integrated servo actuator. The primary objective was to prove the feasibility of incorporating the servo valve, and other vital components, inside the actuator piston for protection from temperature and nuclear radiation environments. Included are design calculations, description of operation with test results. Included also is an evaluation of the design indicating the concept can be feasibly mechanized to give performance comparable to conventional servo actuators. Recommendations are made concerning future design refinements which can be made and upgrading of the concept to an extreme environmental model. (Author)

AD-448 473 Field 13B
CFSTI Price: HC$1.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
ANALYSIS OF TWO-LAYERED PAVEMENT SYSTEMS,
by J. Nielsen. Aug 64, 17p
Technical note N-627
Proj. Y F015 15 02 119

Unclassified report

Descriptors: (*Pavements, Deflection), Elasticity, Load distribution, Analysis, Tests, Data.

This report presents in detail the method of analysis used to interpret plate bearing test data using the Burmister layered pavement theory. The method is applicable to the analysis of any two-layered pavement system. (Author)

CAPE-864 Field 13A

Union Carbide Nuclear Co., Oak Ridge, Tenn.
INDUCTION SINTERING FURNACE, 8N.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Furnaces, Sintering), (*Sintering, Furnaces), Induction heating, Mechanical drawings, Powder metals, Molding, Graphite, Controlled atmospheres, Hydrogen, Nitrogen.

A design is presented for one of nine induction furnaces used in sintering powdered metal configurations, including uranium. A graphite mold is used for casting the powdered metal. The mold is held together by a binder, which burns out during firing. The hot zone is 34 in. dia, 35 in. long, and is used with a hydrogen or nitrogen atmosphere. For details see TID-4100. Includes 1 drawing. (AEC Abstract)

CAPE-1120 Field 13K

California Univ., Livermore. Lawrence Radiation Lab.
ALVA 12 IN. BALL VALVE MODIFICATION.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Valves, Design), Mechanical drawings.

The 12-in., 250-psi valve was modified to include a closing system, which consists of a tension spring actuator and a Conax explosive latch pin. The valve, which is held in the open position until detonated by an electrical signal, closes in about 0.5 sec. The valve was evacuated to a pressure of less than 100 microns of Hg and hydrostatically tested to 1000 psi without leaking. (For details, see TID-4100.) Includes 9 drawings. (AEC Abstract)

Patent 3,176,509 Field 13I

TEMPERATURE COMPENSATED SPRINGS.
Patent assigned to Air Force,
by John C. Schmertz. 6 Apr 65 Unclassified patent
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Springs, Thermal expansion), Accelerometers, Vibration isolators, Force(Mechanics), Pressure, Acceleration, Elasticity, High-temperature research, Patents.

The springs are for use in accelerometers, vibration isolation mounts, and high temperature instruments where force, pressure, or acceleration is measured by employing the stiffness of a spring. Temperature variations which effect the Young's modulus of rigidity of the spring material, may be employed to change the geometry or free length of the spring element. In this manner the differential thermal expansion of the spring material and another material can be used to compensate for the change in the Young's modulus of the spring material and to maintain constant spring stiffness.

Patent 3,179,060 Field 13G, 13J, 13K

SILENT VARIABLE DELIVERY HYDRAULIC PUMP.
Patent assigned to Navy,
by Alexander Lehrer. 20 Apr 65 Unclassified patent
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Hydraulic equipment, Submarines), Hydraulic fluids, Hydraulic cylinders, Patents.

The hydraulic pump is used on a submarine. The apparatus includes a valve device in the form of a plate and a multi-cylinder, parallel piston pump. The pump includes a rotatable assembly comprised of a barrel body with a plurality of parallel cylinders, each containing a piston. The valve is located adjacent the cylinder ports. A swash plate or cam is located adjacent the barrel body. As the barrel body is rotated, the swash plate causes the pistons to reciprocate within the cylinders and thus draw fluid in through the valve at one pressure and expel it through the valve at another pressure.

Patent 3,179,399 Field 13I, 22B

HIGH ENERGY DAMPING SPRING.
Patent assigned to Navy,
by Richard T. Ellis. 20 Apr 65 Unclassified patent
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Springs, Damping), (*Satellites (Artificial), Stabilization systems), Beryllium, Copper, Wire, Gold, Silver, Coatings, Patents.

The energy absorption spring is suitable for absorbing liberation energy about a stabilized axis of a gravity gradient stabilized satellite. The spring is formed from a strand of wire having an inner core of beryllium-copper, a layer of mechanically soft metal deposited upon the beryllium-copper core, and a protective coating of either gold or silver.

PB-167 640 Field 13F, 5C
CFSTI Prices: HC$6.00 MF$1.25

Saunders (W. B.) and Co., Washington, D. C.

STUDIES ON THE ECONOMIC IMPACT OF RAILWAY ABANDONMENT AND SERVICE DISCONTINUANCE. SECTION I. IMPLICATIONS OF RAILWAY ABANDONMENTS (A GENERAL SURVEY). SECTION II. THE ECONOMIC IMPACT OF THE DISCONTINUANCE OF THE RUTLAND RAILWAY (A CONDENSED VERSION).
Jun 65, 216p
Unclassified report

Case study of the Rutland Railway (Condensed Version) prepared by the Boston University Bureau of Business Research.

Descriptors: (*Railroads, Economics), (*Economics, Railroads), Urban areas, Transportation, Costs, Labor unions, Wages, Traffic, Management planning, Decision making, Operation, Railroad cars, Maintenance, Cargo, Vehicles, Tables.

A series of research studies on the economic and social impacts of railroad abandonments and mergers upon regions and communities has been commissioned. Section I of this volume, 'Implications of Railway Abandonments - - A General Survey', by W. B. Saunders and Company, summarizes some of the potential causes, effects, and related issues of railway abandonment; it also suggests topics, methods, and techniques that should be included in future research related to this area. Section II is a condensed version of a study entitled 'The Economic Impact of the Discontinuance of the Rutland Railway'. This case study was prepared by the Boston University Bureau of Business Research, with Dr. Chris A. Theodore as Principal Investigator and Dr. Francis S. Doody as Project Director. The research effort was designed to answer specific questions regarding the major causes and effects of the abandonment of service on the Rutland Railway. In addition it served as one of the sources for the analysis by W. B. Saunders and Company.

PB-167 668 Field 13I, 20K
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Berkeley. Institute of Engineering Research.
NORMAL MODES OF NONLINEAR DUAL MODE SYSTEMS,
by R. M. Rosenberg. Mar 59, 42p
Series no. 106, Issue no. 5
Grant NSF G3302 Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Springs, Nonlinear systems), (*Vibration, Springs), (*Resonance, Springs), Harmonic analysis, Oscillation, Polynomials, Compressive properties, Force(Mechanics), Integration, Loading(Mechanics).

A system consisting of two unequal masses, interconnected by a coupling spring, and each connected to an anchor spring, is examined. The springs may all be unequal and nonlinear, but each resists being compressed to the same degree as being stretched. The concept of normal modes is rigorously defined, and methods of finding them are given. A knowledge of these modes reduces the coupled system to two uncoupled ones which can always be integrated in quadrature. There exists an infinity of systems, of which the linear is one, which can be integrated in closed form. This approach yields, even for the linear system, new results of great simplicity. (Author)

PB-167 669 Field 13I, 20K
CFSTI Prices: HC$2.00 MF$0.50

California Univ., Berkeley. Institute of Engineering Research.

ON THE NATURAL MODES OF TWO DEGREE OF FREEDOM NONLINEAR SYSTEMS WITH SYMMETRIC CUBIC SPRINGS AND UNSYMMETRIC MASSES,
by Cyril P. Atkinson and R. M. Rosenberg. Mar 59, 40p Series no. 106, Issue no. 4
Grant NSF G3302

Unclassified report

Descriptors: (*Springs, Vibration), (*Vibration, Nonlinear systems), (*Harmonic analysis, Nonlinear systems), Resonance, Nonlinear differential equations, Stability, Loading(Mechanics), Oscillation.

PB-167 670 Field 13I, 20K, 12A
CFSTI Prices: HC$3.00 MF$0.75

California Univ., Berkeley. Institute of Engineering Research.
THE SOLUTION OF DUFFING'S EQUATION BY A THREE TERM APPROXIMATION BY THE RITZ-GALERKIN METHOD FOR BOTH THE HARDENING AND THE SOFTENING SPRING SYSTEMS,
by Cyril P. Atkinson and Charles P. Bourne. Aug 57, 59p Series no. 106, Issue no. 1
Grant NSF G3302

Unclassified report

Descriptors: (*Springs, Vibration), (*Nonlinear differential equations, Vibration), (*Vibration, Springs), (*Harmonic analysis, Harmonic oscillators, Resonance, Oscillation.

An investigation is presented of the solutions of Duffing's equation, based on a three term approximation to the solution. The method of solution used is known as the Ritz Averaging Method (or the Ritz-Galerkin Method). Solutions are presented in the form of amplitude vs frequency plots for the three components of the assumed solution. The differential equation was solved with both the plus and minus sign and for both free and forced oscillations. The results from use of the plus sign in the differential equation (hardening spring system) are similar to those of previous investigations showing a third harmonic resonance and possible jump phenomena. A fifth harmonic resonance is also possible. The results from use of the minus sign in the differential equation (softening spring system) are presented in two configurations of amplitude vs frequency curves. One configuration contains the usual fundamental response curve and harmonic response curves of the third and fifth order. Resonance of these harmonics is indicated in certain regions of the amplitude vs frequency plane. The second configuration of amplitude vs frequency curves for the softening spring system is gotten from the algebraic equations of the Ritz-Galerkin method. This configuration contains a dominant third harmonic component. The numerical work was done on an IBM 701 electronic digital computer located at the University of California. (Author)

PB-167 678 Field 13B
CFSTI Prices: HC$2.00 MF$0.50

Public Health Service, Cincinnati, Ohio. Technical Assistance Branch.
AIR POLLUTION MEASUREMENTS IN DUQUESNE, PENNSYLVANIA, SEPTEMBER-OCTOBER 1963,
by Seymour Hochheiser, Melvin Nolan, and Herbert J. Dunsmore. Oct 64, 40p

Unclassified report

Prepared in cooperation with Allegheny County Health Dept., Duquesne, Pa. Bureau of Air Pollution Control.

Descriptors: (*Air pollution, Pennsylvania), Measurement, Tables, Sanitary engineering, Public health.

A cooperative, 1-month, pilot study of ambient air quality was conducted in Duquesne, Pennsylvania, from September 23 to October 30, 1963, to define more precisely the existing and potential community air pollution problems and to serve as a basis for improvement of the air resource management program in the area.

PB-167 679 Field 13B
CFSTI Prices: HC$3.00 MF$0.75

Public Health Service, Cincinnati, Ohio. Technical Assistance Branch.
AIR POLLUTION MEASUREMENTS IN BALTIMORE, MD. MARCH AND APRIL 1964,
by Thomas E. Kreichelt and Elkins W. Dahle, Jr. Nov 64, 59p

Unclassified report

Prepared in cooperation with Baltimore City Health Dept., Md. Bureau of Industrial Hygiene.

Descriptors: (*Air pollution, Maryland), Measurement, Tables, Sanitary engineering, Public health.

A 5-week pilot study of ambient air quality in March and April 1964 was conducted. Various gaseous and particulate pollutants and meteorological parameters were measured on a continuous basis by using mainly the facilities and equipment contained in a mobile air sampling laboratory.

PB-167 695 Field 13B
CFSTI Prices: HC$3.00 MF$0.75

Science Communication, Inc., Washington, D. C.
AIR POLLUTION: TECHNICAL INFORMATION SURVEY.
Final rept.,
by Victor C. Searle. 26 Apr 65, 74p
Contract PH86 65 13

Unclassified report

Descriptors: (*Air pollution, Documentation), Reviews, Bibliographies, Abstracting.

This report is based on the findings from 70 personal interviews and 228 mail questionnaires obtained from various categories of potential users. The user survey is keyed around four general questions: What are your specialized subject interests. What are your principal present information sources. What are your difficulties in securing needed air pollution information. What services can the Center provide to better meet your needs. Of the services which might be provided or sponsored by the Center, the five receiving the highest desire ratings' are: Abstracts, with increased coverage and indexing. Accession lists of references acquired, as an 'express' current awareness medium and specialized announcement service. Bibliographic search services. Periodic state-of-the-art reviews. Critical monographs, as warranted. The first three are generally desired by all groups. Of the last two, the governmental and industrial groups express the greater preference for reviews, while the research community prefers critical monographs. (Extracted.

PB-167 714 Field 13F
CFSTI Prices: HC$2.00 MF$0.50

National Capital Transportation Agency, Washington, D. C.
RAIL RAPID TRANSIT FOR THE NATION'S CAPITAL.
Jan 65, 48p Unclassified report

Rept. on Transit Development Program 1965.

Descriptors: (*Urban areas, Transportation), (*Railroads, Urban areas), Engineering, Costs, Construction, Operation, Traffic, Roads, Passenger vehicles, Tables.

Conclusions and Recommendations: The solution to the transportation problem confronting the National Capital is to develop an alternative to travel by automobile that will offer convenient, fast, economical home-to-work transportation and will enable the highway system to function more effectively by encouraging some people who might otherwise drive to make use of public transportation. The National Capital Transportation Agency Concludes that: The most efficient and economical method of transporting large numbers of people during peak demand periods is by high-capacity, high-performance rail rapid transit. Such a system involves minimal right-of-way requirements, preserves taxable property, reduces the problem of displacing and relocating families and business establishments, and reduces the burden of traffic on streets and highways. By utilizing underground routes, the integrity of neighborhoods and central Washington will be protected and the beauty and dignity of the Nation's Capital preserved. The downtown subway and the network of rapid transit routes described in this Transit Development Program are not only required but are economically practicable. The Agency recommends: That the Congress authorize the Agency to undertake development of the rail rapid transit system described in this report and detailed in the Engineering Supplement. That Congress appropriate the funds necessary to implement the Transit Development Program.

14. Methods and Equipment

AD-440 359 Field 14B
CFSTI Prices: HC$1.00 MF$0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
READING ERRORS PERTAINING TO THE MCLEOD GAGE,
by P. Romann. 15 May 64, 19p RSIC-182
TT 65-62506

Unclassified report

Trans. of le Vide; Technique, Applications (France) n18 p522-30 1948.

Descriptors: (*Pressure gages, Errors), Design, Gases, Numerical analysis, France.

CAPE-848 Field 14E

Los Alamos Scientific Lab., N. Mex.
ROTATING MIRROR CAMERA, MODEL 102.
Engineering Materials.

Unclassified drawing

Price information available from CFSTI upon request.

Descriptors: (*Rotating-mirror cameras, Mechanical drawings), Drives, Turbines, Camera shutters, Blast, Mirrors, High-speed photography.

A camera was designed to photograph high speed events, which are self-luminous or are illuminated by a very intense explosive light source. A 1.5 x 1 in. mirror, driven by a turbine drive, and a blast shutter are included. For details see TID-4100. Includes 20 drawings. (AEC Abstract)

CAPE-1139 Field 14B

Oak Ridge National Lab., Tenn.
PHASE SENSITIVE EDDY-CURRENT CONCENTRATOR.
Engineering Materials.

Unclassified drawing

Price information available from CFSTI upon request.

Descriptors: (*Non-destructive testing, Mechanical drawings), (*Stainless steel, Non-destructive testing), Electric currents, Measurements, Coils, Voltage.

(6 drawings, 3 photographs) This non-destructive testing instrument was originally designed to inspect graphite spheres; however, it is also useful in detecting flaws in any non-magnetic material. The device generates an electromagnetic wave, which induces eddy currents in the conductor being tested. The transmitted or reflected wave is measured by a pickup coil. The voltage differential between the driving and pickup coils permits accurate measurement of stainless steel thickness as great as 1.25 cm (0.5 in.). (For details, see TID-4100.) (AEC Abstract)

CAPE-1140 Field 14B, 13H

Oak Ridge National Lab., Tenn.
ULTRASONIC INSPECTION DEVICE.
Engineering Materials.

Unclassified drawing

Price information available from CFSTI upon request.

Descriptors: (*Non-destructive testing, Ultrasonic radiation), (*Ultrasonic radiation, Non-destructive testing), (*Quality control, Ultrasonic radiation), Pipes, Piezoelectric crystals, Fracture(Mechanics), Thickness, Mechanical drawings.

A through-transmission, ultrasonic inspection device was designed to assure greater quality of small-diameter tubing for leak detector lines, purge gas lines, and other nuclear uses. The pulse-echo technique specified by industry cannot be used for tubing less than 0.250 in. in dia. This device transmits a very narrow beam of sound at ultrasonic frequencies into the tube wall and received this sound with a piezoelectric crystal after it has passed through a segment of the tube wall. The signal is electronically amplified and monitored. A decrease in the received signal, due to anomalies in the tube wall, is evaluated as a measure of tube quality. Cracks, seams, and eccentricity, which cause a 10% or greater reduction in effective wall thickness, can be detected. Tube sizes as small as 0.090 in. in dia. were inspected. (For details, see TID-4100.) Includes 2 drawings. (AEC Abstract)

CAPE-1165 Field 14B, 11F

Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
CUTTING MACHINE AND EXAMINATION FACILITY, CELLS 9.
Engineering Materials.

Unclassified drawing

Price information available from CFSTI upon request.

Descriptors: (*Cutting tools, Remote control systems), (*Metallography, Cutting tools), Mechanical drawings, Metallography, Test facilities, Radioactivity, Ultrasonic radiation, Cleaning, Test equipment.

A remotely operated machine was designed for use in Cell 9 of the Metallography Facility for cutting specimens of radioactive materials for metallographic examinations and chemical studies. Either an abrasive or diamond wheel may be used for cutting specimens of various sizes and shapes ranging from a 0.5-in. cube to a 3.5 x 3.5 x 35

in. bar. The materials are cut under water in a box to contain the radioactive waste. The cell also contains an ultrasonic cleaner, centrifuge, and scrubber. (For details, see TID-4100.) Includes 26 drawings. (AEC Abstract)

CAPE-1186 Field 14C, 13H

Rocky Flats Plant, Dow Chemical Co., Denver, Colo.
TEMPERATURE VERIFICATION SYSTEM.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Recording systems, Temperature), (*Thermistors, Quality control), Glass, Mechanical drawings, Errors, Meters.

The temperature verification system described is used to determine and minimize temperature effects during inspection and certification of production parts. The maximum allowable gaging error attributed to temperature cannot exceed 10% of the part tolerance. The 10% must include uncertainities of coefficients of linear expansion and 'drift' rates. The instrument consists of two glass bead thermistors; one mounted in the outer tool holder of the rotary gage and the other on a sensing head. These are plotted by a chart recorder showing the temperature difference between the gage and the part. Electronics consist of two parts: one unit has all heat producing parts including power supplies and relays, and the other has heat sensitive parts including calibration resistors and an operational amplifier. The entire unit fits into a standard 19-in. rack. The total height is 7 in. (For details, see TID-4100.) Includes 11 drawings. (AEC Abstract).

Patent 3,177,704 Field 14B, 13G

LEAK TESTING METHOD.
Patent assigned to Navy,
by Robert H. Stange. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Pressure vessels, Test equipment), Pressure gages, Patents.

The method is for making quantative determinations of the leak rates of pressure vessels charged with dry permanent gases. The pressure vessel charged with a dry permanent gas is enclosed within a sealed chamber having a small clearance between it and the vessel. The clearance volume is evacuated. A predetermined quantity of the gas is introduced into the clearance volume to produce a pressure rise which corresponds to the maximum allowable leak rate of the vessel. A McLeod guage is used to measure the pressure changes in readings are noted.

Patent 3,180,140 Field 14B

VARIABLE CONTOUR NOZZLE.
Patent assigned to Navy,
by Frederick E. Mickey. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Wind tunnel nozzles, Supersonic nozzles), Supersonic diffusers, Nozzle gas flow, Patents.

The variable nozzle is for ejecting a secondary supersonic airflow at the throat of a supersonic diffuser in a wind tunnel so as to give support to a primary supersonic flow as it streams past a test model upstream from the diffuser. The model appears to be a missile. The end portions of the nozzle can be rotated to assume various shapes for changing the contour of the nozzle.

Patent 3,180,210 Field 14B, 20F

INSTRUMENT FOR MEASURING VOLUME ABSORPTION COEFFICIENTS OF HORIZONTALLY STRATIFIED WATER.
Patent assigned to Navy,
by John E. Tyler. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Optical instruments, Underwater light), (*Underwater light, Measurement), Absorption, Scattering, Sea water, Electron optics, Optical properties, Phototubes, Computers, Patents.

The electro-optical probe converts measured flux for downwelling, upwelling, and spherical irradiance of a given ambient environmental medium, such as sea water, into respective analog signal parameters. These may be processed by a computer. The single-probe, single-phototube absorption meter determines underwater light conditions.

PB-167 656 Field 14B, 20K
CFSTI Prices: HC$1.00 MF$0.50

Holloman Air Development Center, Holloman AFB, N. Mex.
TABLES FOR THE COMPUTATION OF SLED MOVEMENT,
by Egon E. Muehlner. 1 Jan 54, 24p
HADC-TN-54-1
AD 24 538
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Rocket-propelled sleds, Motion), Tables, Acceleration, Velocity, Deceleration.

15. Military Sciences

PB-167 597 Field 15G
CFSTI Prices: HC$7.00 MF$2.00

Operations Research Office. Johns Hopkins Univ., Chevy Chase, Md.
BASIC PATTERNS OF POLITICAL AND PROPAGANDA OPERATIONS IN THE SOVIET ARMED FORCES, VOLUME I,
by Louis Nemzer. 26 Jan 53, 381p
Technical memo ORO-T-215
AD 32 799
Unclassified report

Descriptors: (*Psychological warfare, Propaganda), (*Propaganda, USSR), Communism, Military training, Armed forces(Foreign), Political science, History, Communists, Military personnel, Officer personnel, Enemy personnel, Fear, Emotions, Newspapers, Motion pictures, Radio broadcasting, Armed forces operations.

The research is intended to help meet one of the requirements for a possible psychological campaign directed at the military personnel of the USSR. The foci of the study are the psychological climate which the Soviet leaders tried to establish in their armed forces, and the structure, operational methods, and psychological techniques of the political agencies used in this effort. It is stressed that the data for an intensive study of the Soviet soldiers' reactions to this climate and these agencies do not exist in the Western world, although the available materials have been used in this study whenever possible. The main purpose of the study, however, is to determine the patterns of the system which the Soviet leaders are striving to establish, noting the shortcomings in the system as it has evolved thus far.

PB-167 631 Field 15G, 12B
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
AN INTRODUCTION TO WAR GAMES,
by M. G. Weiner. 17 Aug 59, 42p
Rept. no. P-1773
AD 221 676

Unclassified report

To be published in Sequential Decisions and Simulation.

Descriptors: (*Game theory, Warfare), (*Warfare, Simulation), Military strategy, Military tactics, Strategic warfare, Decision theory, Sequential analysis.

Some general information on war games is presented. A short history of war games is given and the various characteristics, techniques, and types of war games are introduced. An illustration of the steps in an umpired war game is included.

16. Missile Technology

Patent 3,179,010 Field 16A

EXTENSIBLE LAUNCHING RAIL.
Patent assigned to Navy,
by John T. Bratton. 20 Apr 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Guided missile launchers, Shipborne), Patents.

The shipboard launcher is for launching rocket propelled missiles. A missile launching rail is provided, associated with a missile housing, which may be retracted into the missile housing until missile launching is desired, at which time it may be extended to provide a length adequate for launching the missile. The motion of the launching rail is utilized during its extension and retraction to open and close closure doors disposed at the launching end of a launching cell. Pneumatic power is used.

Patent 3,181,814 Field 16B, 19E

MISSILE TARGET INTERCEPT ANGLE MEASURING SYSTEM.
Patent assigned to Navy,
by Charles W. Pittman. 4 May 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Target angle, Intercept trajectories), (*Guided missile trajectories, Intercept probabilities), (*Intercept probabilities, Guided missiles), Measurement, Telemeter systems, Optical equipment, Patents, Target acquisition.

The system is for measuring the intercept angle between a flying target and a missile in flight. Sensing devices on the missile produce signals indicative of the angle between the missile and the target. The signals are telemetered and recorded to provide target intercept information. The sensing device may be in the form of an optical device.

17. Navigation, Communications, Detection, and Countermeasures

AD-403 386 Field 17B, 9D
CFSTI Price: HC$4.00

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE DESIGN OF COMMUNICATION SYSTEMS,
by Keats A. Pullen, Jr. Dec 62, 132p
Rept. no. 1186
Proj. 1M222901A215

Unclassified report

Descriptors: (*Communication systems, Design), Radio communication systems, Reliability(Electronics), Radiotelephones, Radio equipment, Radio transmission, Radio interference, Remote control systems, Data transmission systems, Portable, Mobile, Power, Amplitude modulation, Frequency modulation, Pulse modulation, Signal-to-noise ratio, Radiofrequency, Communication theory, Theory, Aerial targets, Phase measurement, Tracking, Doppler systems, Drones, Direction finding, Command + control systems, Communication equipment.

The design of communication systems for the achievement of reliability and efficiency requires a thorough understanding of basic and practical limitations, and their relations to the choices which can be made. The initial section of this report explores in considerable detail the more important limiting factors on free-space communications and shows how the effects of the various factors can be minimized. The remaining section applies the resulting discussion to typical problems to show how principles of communications theory and information engineering can be combined to develop improved methods of communication. (Author)

N65-17334 Field 17G, 22C
CFSTI Prices: HC$3.00 MF$0.75

National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
APPLICATION OF STATISTICAL FILTER THEORY TO THE INTERPLANETARY NAVIGATION AND GUIDANCE PROBLEM,
by John S. White, George P. Callas, and Luigi S. Cicolani. Mar 65, 88p
NASA-TN-D-2697

Unclassified report

Descriptors: (*Interplanetary trajectories, Space navigation), (*Guidance, Space navigation).

N65-20407 Field 17B, 22B
CFSTI Prices: HC$3.00 MF$0.75

National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
UNIFIED S-BAND TELECOMMUNICATIONS TECHNIQUES FOR APOLLO,
by John H. Painter and George Hondros.
Mar 65, 81p NASA-TN-D-2208
Unclassified report

Descriptors: (*Space communication systems, S band), Lunar satellites, Telemeter systems, Tracking.

Patent 3,179,355 Field 17G, 22C

GUIDANCE AND CONTROL SYSTEM.
Patent assigned to Army,
by William H. Pickering and Robert J. Parks. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Command guidance, Guided missiles), (*Control systems, Guided missiles), Doppler navigation, Radar tracking, Radar equipment, Radar beacons, Radar receivers, Guided missile computers, Patents.

The control system is for guiding a ballistic missile on a predetermined trajectory. The guidance of the missile is based on a command guidance system in which the position and velocity of the missile is measured by ground based radio equipment. This equipment includes a radar tracking system, a Doppler radar station and four computers including azimuth, elevation, postburnout and shutoff computers. The missile carries a radar receiver, a beacon and other control devices.

Patent 3,181,059 Field 17F, 14C

OPTICAL POLARITY INDICATOR FOR MAGNETICALLY RECORDED SIGNALS.
Patent assigned to Army,
by Gerald L. Mohnkern. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Magnetic recording systems, Polarization), (*Magnetic tape, Visual inspection), Optical equipment, Signals, Electromagnets, Patents.

The optical device visually determines the polarity of magnetically recorded data on a magnetic tape. The device includes an electromagnet, a reversible D.C. power supply connected to the electromagnet so that the field is perpendicular to the tape which is positioned over the electromagnet. A viewer is positioned over the tape and directly over the magnet. The viewer carries a transparent fluid with particles of metal. The magnetic field causes the particles to collect over the data on the tape.

Patent 3,182,320 Field 17I, 17G

AUTOMATIC RANGE AND AZIMUTH TRACK WHILE SCAN SYSTEM.
Patent assigned to Air Force,
by Alan I. Frank. 4 May 65 Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Track-while-scan, Aircraft landings), Radar scanning, Gates(Circuits), Video signals, Azimuth, Approach indicators.

The system is for tracking aircraft in their approach zone to a landing field while a radar antenna beam scans the zone. The system includes a photocell probe target selector and associated circuitry which is used to pick up and lock-on a target representation on a P.P.I. A tracking gate compares incoming target video with previous target position representations and corrects previous representations with present target information.

Patent 3,182,321 Field 17I, 1C

SCANNER CO-ORDINATE COMPENSATOR FOR RADAR-BEARING CRAFT.
Patent assigned to Navy,
by Ralph I. Hauser and David R. Houston. 4 May 65
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Radar scanning, Aircraft), Radar tracking, Radar targets, Circuits, Patents.

The system, during a tracking operation involving successive target observations, compensates for the effects of maneuvers of the radar carrying aircraft. Electronic components and circuitry are provided to vary the time at which the radar receiver is gated as a function of the aircraft maneuvers between successive target observations.

PB-167 595 Field 17I, 9D, 12A
CFSTI Prices: HC$3.00 MF$0.75

Michigan Univ., Ann Arbor. Engineering Research Inst.
THE THEORY OF SIGNAL DETECTABILITY. PART I. THE GENERAL THEORY,
by W. W. Peterson and T. G. Birdsall. Jun 53, 61p
Technical rept. no. TR-13, pt. 1
Contract DA36 039sc15358, Projs. 399 04 042, M970, Task EDG3 Unclassified report
AD 16 786
Available copy will not permit fully legible reproduction.

Descriptors: (*Signals, Detection), (*Statistical analysis, Detection), Radar signals, Radio signals, Probability, Errors, Statistical distributions, Reliability(Electronics), Communication theory, Noise(Radar), Radar receivers, Optimization, Demodulation.

The several statistical approaches to the problem of signal detectability which have appeared in the literature are shown to be essentially equivalent. A general theory based on likelihood ratio embraces the criterion approach, for either restricted false alarm probability or minimum weighted error type optimum, and the a posteriori probability approach. Receiver reliability is shown to be a function of the distribution functions of likelihood ratio. The existence and uniqueness of solutions for the various approaches is proved under general hypothesis. (Author)

18. Nuclear Science and Technology

AD-444 935 Field 18D, 14E
CFSTI Price: HC$1.00

Naval Radiological Defense Lab., San Francisco, Calif.

PHOTOGRAPHIC DETECTION OF FAST NEUTRONS: APPLICATION TO NEUTRON RADIOGRAPHY,
by E. Tochilin. 21 Jul 64, 25p USNRDL-TR-766
Proj. SF011 05 11, Task 0503
N64 32871

Unclassified report

Descriptors: (*Fast neutrons, Radiography), (*Radiography, Fast neutrons), Photographic emulsions, Measurement, Energy, Exposure, Gamma rays, Aluminum, Lead, Copper, Plastics, Thermal neutrons, Resolution, Phosphorescent materials, Photographic film.

The response of photographic emulsions to fast neutrons has been studied by direct measurements at two neutron energies and by exposure to high-energy charged particles. Dose response was significantly less for neutrons than for gamma rays and decreased progressively with decreasing neutron energy. Increased neutron sensitivity was obtained by use of organic scintillators as intensifying screens in conjunction with film. Neutron radiographs at two different energies were taken with step wedges made of Al, Cu, Pb and plastic. Radiographs were taken behind 2, 4, 6 and 8 inches of lead. Loss of photographic resolution from gamma rays produced in the test sample and by thermal neutron interactions is discussed. (Author)

CAPE-745 Field 18D

Oak Ridge National Lab., Tenn.
THERMAL NEUTRON SURVEY METER.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Count-rate meters, Neutron detectors), (*Neutron detectors, Thermal neutrons), Health physics instrumentation, Portable, Mechanical drawings.

Includes 5 drawings. A transistorized count-rate instrument used in health physics is described. It is compact, light in weight, and has permanent-type rechargeable batteries. The B10F3 counter is fastened to the front of the case. The instrument has three ranges with calibrations of 200, 2,000, and 20,000 neutrons sq cm sec. It consists of a pulse amplifier, discriminator, duty cycle meter, transistorized 1200-v regulated power supply, and a built-in battery charger. The cabinet is 8 in. x 5 1/2 in. x 5 in. and weighs 4 lb. The accuracy is ±6% over the operating range of battery and temperatures from 40 to 100 F. For details see TID-4100. (AEC Abstract)

CAPE-919 Field 18D

Oak Ridge National Lab., Tenn.
THIMBLE-TYPE ION CHAMBER /Q-747/.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Ionization chambers, Specifications), Gamma counters, Remote control systems, Styrene plastics.

The ionization chamber is used to read high level intensity gamma radiation for remote operation. The thimble is 5/8 in. OD, 1/2 in. ID, and is constructed of thick polystyrene. The cylinder is 7/8 in. long with a 5/16 in. hemispherical bottom. The hemispherically shaped electrode is constructed of polystyrene 1/8 in. OD, 5/8 in long with a 1/16 in. radius. The instrument is 30 in. long. (AEC Abstract)

CAPE-926 Field 18D

Oak Ridge National Lab., Tenn.
THRESHOLD DETECTOR PLACEMENT CONTAINER.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Radiation measurement systems, Mechanical drawings), Containers, Aluminum.

Includes 1 drawing. The container described is used with a threshold detector. It consists of a cover plate and a retainer plate, which are fabricated of Al 100. Special locations are provided in a pan 0.5-in deep for the Cd filter, and Au and S samples. A sphere, which is built half way in the cover and retainer plates, holds the 10B threshold detector. (For details, see TID-4100.) (AEC Abstract)

CAPE-952 Field 18D

Lawrence Radiation Lab., Univ. of California, Livermore.
DIAGNOSTIC PINHOLE ASSEMBLIES.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Neutron detectors, Mechanical drawings), Nuclear explosions, Underground explosions.

Includes 34 drawings. Devices used with neutron detectors to show patterns of neutrons released in underground nuclear tests are described. The patterns of the released neutrons are picked up and reproduced at the detector. The steel tubes are 66 in. long, 25 in. OD; 40 in. long, 10 in. OD; and 20 in. long, 5 in OD. For details see TID-4100. (AEC Abstract)

CAPE-1119 Field 18D

Oak Ridge National Lab., Tenn.
LIQUID ENTRAINMENT SEPARATOR FOR U2.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Liquids, Separation), (*Uranium, Separation), Evaporators, Neutron absorbers, Specifications.

The entrainment separator is used to remove mist from exhaust vapors of an evaporator. The 12 1/4-in.-ID, 42-in.-long, stainless steel vessel consists of a vapor inlet distribution section, a section packed with 5/8 in. glass Raschig rings, and a vapor outlet section. The Raschig rings contain approx. 4 wt % of B which is the neutron absorbing material; thus making the unit nuclearly safe for the highly enriched U solutions (up to 93.2% 235U) found in diffusion plant operation. (AEC Abstract)

CAPE-1153 Field 18J, 14B

General Electric Co., Hanford Atomic Products Operation, Richland, Wash.
PRTR FUEL ELEMENT RUPTURE TESTING FACILITY.
Engineering Materials.

Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Test facilities, Reactor fuel elements), (*Reactor fuel elements, Test facilities), Rupture, Plutonium, Test reactors, Research reactors, Power reactors.

The facility was designed to permit testing of high-risk or defective fuel elements with either single pass or recirculating coolant to maximum conditions of 600 F and 2000 psi. It is used to permit determination of the real operating limits of Plutonium Research Test Reactor (PRTR) and future power reactor fuel elements. The test loop activity can be monitored and loop cool-down rates can be controlled and programmed. The high temperature and pressure segment of the facility is located in the experimental (B) cell of the PRTR. The remainder of the equipment is located outside the cell. (For details, see TID-4100.) Includes 25 drawings. (AEC Abstract)

CAPE-1158 Field 18D

Oak Ridge National Lab., Tenn.
PROGRAMMED CRYSTAL ORIENTER /Q-2103/.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Reactor fuel plates, Scanning), (*Radiation measurement systems, Scanning), X rays, Automatic, Control systems, Mechanical drawings.

An automatic control system used to scan reactor fuel plates is described. A collimated x-ray beam scans the High Flux Isotope Reactor (HFIR) fuel plate, and a scintillation counter detects variations of transmitted x-ray intensity to indicate the fuel distribution and total fuel within a plate. The readout is a printed paper tape and a strip-chart record. The system will perform with an accuracy of 1%. (AEC Abstract)

CAPE-1162 Field 18D, 9C

Lawrence Radiation Lab., Univ. of California, Livermore.
DECADE SCALER, 10 MC.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Scalers, Design), Pulse counters, Mechanical drawings, Radiation measurement systems.

A modular design scaler that uses solid state circuitry and printed boards is described. One 10 Mc decimal counting unit and six 1 Mc decimal counting unit modules give a count capacity of 10 to the 7th power. The scaler also contains a Gate and Scaler Control and a 10-Mc pulse height discriminator. Two complete scalers (18 modules) plug into a standard rack mounting frame of 3 1/2 in. front panel height. The rear panel mounts the power supply module and signal input connectors. The front panel is made up entirely of adjacent plastic sections attached to each printed circuit board. The module contains a signal gate for gating the scaler and circuitry for generating the scaler reset pulse. The 10-Mc pulse height discriminator generates a fast output pulse to trigger the scaler and discriminates against low amplitude pulses by generating an output pulse only when the input pulse exceeds a predetermined level. (AEC Abstract)

CAPE-1169 Field 18D

Oak Ridge National Lab., Tenn.
PCP II MULTISECTION ION CHAMBER /Q-2618-107/.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Neutron detectors, Design), Reactor control, Reactor safety systems, Test reactors.

A neutron detector designed primarily for the control and safety of the ORNL Fast Burst Reactor is described. The detector has two electrically independent, B-coated, uncompensated chambers which share the same gas. These chambers are N2-filled at 1000 ± 20 mm Hg. The electrodes are closely spaced parallel plates. The instrument is 35 in. long with a 2.5-in. maximum OD. It has a Ni casing and a 5/16-in.-thick lead shield. The chamber and cabling are designed for a maximum voltage between electrodes of 600 v and a maximum temperature of 125C. The chamber and cabling are moisture proof and the cable will withstand an accumulated radiation of 5 x 10 to the 8th power rads. (AEC Abstract)

CAPE-1175 Field 18B

Oak Ridge National Lab., Tenn.
SOURCE FABRICATION EQUIPMENT.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Radioactivity, Sources), (*Strontium, Radioactive isotopes), (*Cesium, Radioactive isotopes), Mechanical drawings, Presses(Machinery), Dies, Filters(Fluid).

The equipment described is used in preparing Sr90 and Ce144 sources. It includes a precipitate filter, dies, and presses for Sr90. Also included are a V-band clamp and filter alterations necessary to handle Ce144 sources. The Sr90 filter is a ceramic thimble 110 mm in dia, 300 mm long, with a 3 mm thick wall. It is housed in a pot 12.625 in. high with walls 0.1875-in. thick. The OD of the flange is 8.125 in. and the OD of the pot is 7 in. The filter housing used for Ce144 is 9.625 in. OD at the flange and is constructed of stainless steel. The stainless steel V band clamp has a radius of 4.906 in. The clamp is 1.375 in. x 1 in. (For details, see TID 4100.) Includes 8 drawings. (AEC Abstract)

CAPE-1179 Field 18J

Rocky Flats Plant, Dow Chemical Co., Denver, Colo.
RESIDUE LEACHING FACILITY.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Plutonium, Separation), Solvent extraction, Tantalum, Industrial equipment, Vacuum pumps, Hydralic pressure pumps, Storage tanks, Pipes, Conveyers, Mechanical drawings.

The facility used to recover plutonium values from leachable residues is described. Included is equipment used in extraction, calcining, and tantalum leaching. Also included are descriptions of hydraulic and vacuum pumps, storage tanks and piping, conveyer systems, scrubber systems, and a glove box. (For details, see TID-4100.) Includes 69 drawings. (AEC Abstract)

CAPE-1181 Field 18J, 7B

Rocky Flats Plant, Dow Chemical Co., Denver, Colo.
CONTINUOUS FLUORINATION OF PLUTONIUM.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Plutonium, Fluorination), Oxides, Fluorides, Mechanical drawings.

(35 drawings) The hydrofluorinator described is used to continuously convert plutonium oxide to plutonium tetrafluoride. Also included are drawings describing a feed hopper, lined tube, product solids receiver, dry boxes, movable neutron shielding, a conveyor system, and piping. (For details, see TID-400.) (AEC Abstract)

CAPE-1182 Field 18G

Rocky Flats Plant, Dow Chemical Co., Denver, Colo.
WASTE INCINERATOR FOR BURNABLE PLUTONIUM WASTE.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Radioactive waste, Incinerators), (*Plutonium, Radioactive waste), Disposal, Recovery, Heat exchangers, Fire alarm systems.

The incinerator is used as a production unit to efficiently recover plutonium values from wastes and to reduce the volume of necessary storage. The facility includes the incinerator, 3 heat exchangers, slag wool filters, tar sump, and a walk in plenum. The plenum facilitates changing filters and monitoring filter conditions. Also included are drawings describing a glove box, piping, and a fire detection system. Thirty-eight drawings are included. (AEC Abstract)

CAPE-1187 Field 18D

Oak Ridge Gaseous Diffusion Plant, Tenn.
ALPHA MONITOR.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Alpha counters, Radiation monitors), (*Radiation monitors, Mechanical drawings), Radiation alarms, Dose rate.

Includes 12 drawings. A fixed filter instrument was designed to monitor airborne alpha-emitting uranium dust. As airborne dust containing natural atmospheric radon daughters is collected, the activity increases to a quasi-equilibrium value at which time the rate of deposition equals the rate of decay. Uranium dust is observed as a rapid change from equilibrium. A differentiating circuit actuates an alarm when the rate of increase of radioactivity exceeds that expected. A vacuum pump draws the air through a filter-paper disc, which collects the dust. A scintillation detector is used to detect the alpha activity. The monitor alarms within 15 min when uranium dust concentration exceeds 2.1 x 10 to the -10th power micro Curies/cc. This is 3.5 times the maximum permissible concentration for a 40-hr per week exposure. The instrument can measure the average weekly concentration by removal of the filter disc and the measurement of its radiation level after an appropriate decay period. For details see TID-4100. (AEC Abstract)

CAPE-1193 Field 18J

Oak Ridge National Lab., Tenn.
BETA SOURCE SHIELD.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Shielding, Beta particles), Mechanical drawings, Radiation damage, Catalysts, Solids.

Includes 3 drawings. The beta source shield was designed to contain 80 C of 90 Sr to study the radiation effects on solid catalysts. The beta particles that are released have a very short range and are most suitable for use with thin layers of solid or liquid samples. The energy can be deposited more efficiently for gases. Dose rates were measured from 0.7 to 4.26 Mr. The shield is 11.5 in. high, 9.5 in. OD at the base, and 6 in. OD at the top. It is fabricated of stainless steel and lead. The source container is 1.38 in. high and 1.38 in. OD. (For details, see TID-4100) (AEC Abstract)

CAPE-1197 Field 18J

Brookhaven National Lab., Upton, N. Y.
FUEL ELEMENT TYPE KD FOR THE HFBRR.
Engineering Materials.
Unclassified drawing
Price information available from CFSTI upon request.

Descriptors: (*Reactor fuel elements, Mechanical drawings), Specifications, Research reactors.

(2 drawings, 1 specification) Fuel elements used in the High Flux Beam Research Reactor (HFBRR) at the Brookhaven National Laboratory are described. The reactor is used to provide intense beams of neutrons for research purposes, such as resonance measurement with neutron choppers, diffraction studies on complicated structures, low-temperature neutron alignment measurements using polarization neutrons, and a series of solid-state problems involving low-lying excitation states in solids. Each fuel element consists of 19 curved, AT-U alloy fuel plates attached to grooved side-plates by roll swaging, an inlet shroud assembly above the fuel plates, and a supporting structure below the fuel plate section. The two outside fuel plates are thicker than the inner plates and each outside plate contains half the U loading of an inner plate. (For details, see TID-4100.) (AEC Abstract)

ORNL-3776 Field 18D
CFSTI Prices: HC$5.00 MF$1.00

Oak Ridge National Lab., Tenn.
NUCLEAR SAFETY PROGRAM SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1964.
Mar 65, 139p
Contract W-7405-ENG-26
Unclassified report

Descriptors: (*Fission products, Reactor accidents), (*Reactor safety systems, Fission products).

ORNL-3780 Field 18J
CFSTI Prices: HC$2.00 MF$0.50

Oak Ridge National Lab., Tenn.
DEVELOPMENT OF NONDESTRUCTIVE TESTING TECHNIQUES FOR THE HIGH FLUX ISOTOPE REACTOR FUEL ELEMENT,
by R. W. McClung. Apr 65, 21p
Contract W-7405-ENG-26
Unclassified report

Descriptors: (*Reactor fuel elements, Non-destructive testing).

Patent 3,178,258 Field 18J, 7B

SEPARATION OF PLUTONIUM HEXAFLUORIDE FROM URANIUM HEXAFLUORIDE BY SELECTIVE SORPTION.
Patent assigned to AEC,
by George L. Cathers and Robert L. Jolley. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Reactor fuels, Separation), (*Plutonium compounds, Chlorides), (*Uranium compounds, Chlorides), (*Chlorides, Sorption),Gases, Fluorides, Lithium compounds, Calcium compounds, Sodium compounds, Patents.

A gaseous mixture containing volatilized uranium hexafluoride and plutonium hexafluoride is contacted with a porous mass of a metal fluoride selected from the group lithium fluoride, sodium fluoride, and calcium fluoride under conditions to selectively sorb the plutonium hexafluoride on the porous mass and thereafter recovering a highly purified uranium-free plutonium product. Final recovery of the selectively sorbed plutonium values in purified form may then be effected by various simple operations depending upon the sorbent used.

Patent 3,178,259 Field 18J, 7B

NITRIDED ELECTRODE PROCESS OF PREPARING URANIUM MONONITRIDE.
Patent assigned to AEC,
by Ellis L. Foster, Jr., and Roy W. Endebrock.
13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Reactor materials, Uranium compounds), (*Reactor fuels, Uranium compounds), (*Uranium compounds, Nitrides), Electrochemistry, Uranium, Electrodes, Nitrogen, Films, Cathodes(Electrolytic cells), Electric arcs, Patents.

Uranium mononitride is useful as a fuel or blanket material in a nuclear reactor. It is produced by cathodically reacting a uranium metal mass with nitrogen at a rate to form a skin over the metal mass while leaving the interior of the mass unaffected. The metal is then cathodically reacted with nitrogen at an increased rate to convert the interior of the mass to uranium mononitride.

Patent 3,178,356 Field 18L

NUCLEAR REACTOR.
Patent assigned to AEC,
by Clifford W. Wheelock. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Nuclear reactors, Power reactors), (*Power reactors, Nuclear reactors), Liquid cooled, Organic moderated reactors, Patents.

The liquid moderated and cooled reactor is for the production of power. The reactor vessel has a bottom head, coolant flow ducts, each being connected to and supporting a sectional grid and a plurality of fuel elements. Each grid has structure for supporting at least one fuel element. A coolant is passed through the fuel elements. Sectional grid and coolant flow ducts, a control rod and a rod controlling device are provided.

Patent 3,179,501 Field 18J

COUNTERCURRENT NUCLEAR-FUEL LIQUID-LIQUID EXTRACTION APPARATUS.
Patent assigned to AEC,
by James P. Duckworth. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Solvent extraction, Reactor fuels), (*Reactor fuels, Solvent extraction), Reactor fuel rods, Critical assemblies, Patents.

The solvent extraction apparatus is utilized in the processing of nuclear reactor fuel and blanket materials such as spent fuel rods from a nuclear reactor. The apparatus includes an elongated, cylindrical, vertical column. A heavy liquid inlet at the top of the column, a light-liquid inlet at the bottom, sieve plates along the length of the column and upper and lower annular vessels with radiating conduits.

Patent 3,179,503 Field 18B, 18J, 7B

EXTRACTION OF CESIUM FROM AQUEOUS SOLUTION USING PHENOLS.
Patent assigned to AEC,
by Donald E. Horner, David J. Crouse, Jr. and Keith B. Brown. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Cesium, Separation), (*Fission products, Separation), Ores(Metal sources), Organic solvents, Phenols, Isotopes, Patents.

The process is for the separation of cesium-137 from an aqueous solution of nuclear fission products and from cesium-containing ores. The cesium is recovered from the solution with an aqueous immiscible organic solvent phase consisting of an orthobenzyl phenol dissolved in an organic diluent. The cesium is recovered from the organic solvent phase.

Patent 3,179,723 Field 18J, 11F

METHOD OF FORMING METAL CARBIDE SPHEROIDS WITH CARBON COAT.
Patent assigned to AEC,
by Walter V. Goeddel. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Reactor fuels, Carbides), (*Carbides, Reactor fuels), Carbon, Spheres, Metals, Coatings, Graphite, Patents, Heat-resistant materials.

The metal carbide spheroids are useful in nuclear reactors. The metal carbide particles have a protective carbon coating and have increased thermal stability at elevated temperatures.

Patent 3,180,704 Field 18J

PROCESS OF MAKING ACTINIDE SULFIDE AND SIMILAR COMPOUNDS.
Patent assigned to AEC,
by Yehuda Baskin. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Reactor fuels, Preparation), (*Actinide series compounds, Sulfides), (*Uranium compounds, Sulfides), Powder metals, Sulfuration, Phosphides, Arsenic compounds, Plutonium compounds, Thorium compounds, Refractory materials, Patents.

The compounds may be used as fuel for nuclear reactors. The process includes mixing actinide metal powder and nonmetal powder of Group VA and/or VIA in stoichiometric quantities as to the equiatomic compound to be produced, introducing the mixture into a die, applying a mechanical load to the reaction mixture, and heating it in the die to a temperature of between 340 and 440 degrees C., whereby a spontaneous exothermic reaction takes place which brings the temperature instantaneously and momentarily to above melting temperature, so that the reaction product obtained is softened and then compressed by the load; and cooling the product. A dense and strong refractory material is obtained.

Patent 3,180,800 Field 18I, 18J

NEUTRONIC REACTOR INCLUDING MEANS FOR UNLOADING AND HERMETICALLY ENCLOSING SPENT FUEL ELEMENTS.
Patent assigned to AEC,
by Peter Fortescue and David Nicoll. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Nuclear reactors, Reactor fuel processing), (*Reactor fuel elements, Disposal), Control rods, Power reactors, Gas-cooled reactors, Patents.

The fuel element and control rod transfer apparatus is for use with gas-cooled power reactors. The fuel elements are positioned and supported in such a manner that a transfer coffin can be placed over the element. A crimping device is provided to crimp and seal the ends of a tubular canister which is positioned within a passage of the transfer coffin.

Patent 3,180,801 Field 18I, 18L

HEAVY WATER MODERATED ORGANIC COOLED NUCLEAR FISSION REACTOR.
Patent assigned to AEC,
by Royce J. Rickert, William S. Flinn, John F. Rohlin and John J. Roth. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Heavy water reactors, Organic cooled reactors), Nuclear reactors, Power reactors, Reactor control, Reactor reactivity, Patents.

An organic liquid cooled D20 moderated nuclear reactor is provided which has reduced neutron losses. The reactor is designed to produce power. A unique arrangement is disclosed in which no excess reactivity is provided which has to be controlled during steady-state operation. Fuel is moved during reactor operation to insure that the radial and axial gross flux and power distributions are always the same as those of a freshly loaded core.

PB-167 815 Field 18H, 11B, 9A
CFSTI Prices: HC$4.00 MF$1.00

Admiral Corp., Chicago, Ill.
EFFECTS OF NUCLEAR RADIATION ON QUARTZ CRYSTAL UNITS (PR+C 61-ELP/D-4206).
Quarterly progress rept. no. 2, 23 Nov 61-22 Feb 62,
by B. Gerstein, A. Schlueter, and A. Fueyo.
30 Mar 62, 138p Rept. no. R-3
Contract DA33 039SC85322
AD 277 814
Unclassified report

See also PB-163 481.

Descriptors: (*Quartz, Radiation damage), (*Radiation damage, Crystals), Linear accelerators, Protons, Fast neutrons, Gamma rays, Electrons, Cyclotrons, Neutrons.

Designs of quartz crystal units are evaluated in the environment of a linear accelerator for fast neutron, gamma and electron doses and in a cyclotron for neutrons and protons. In addition, recommendations for improved materials and fabrication techniques will be made, and such modified quartz crystal units will be irradiated in a Godiva environment. (Author)

PNE-107F Field 18C
CFSTI Prices: HC$3.00 MF$0.75

Lawrence Radiation Lab., Univ. of California, Livermore.
THE ENVIRONMENT CREATED BY A NUCLEAR EXPLOSION IN SALT,
by D. Rawson, C. Boardman, and N. Jaffe-Chazan.
Sep 64, 94p
Contract W-7405-ENG-48
Unclassified report

Descriptors: (*Nuclear explosions, Environmental tests).

TID-21600 Field 18B, 6H
CFSTI Prices: HC$3.00 MF$0.75

Bureau of Commercial Fisheries, Gloucester, Mass. Technological Lab.
STUDY OF IRRADIATED-PASTEURIZED FISHERY PRODUCTS.
Rept. for 1 Oct 63-30 Sep 64,
by Joseph W. Slavin and Louis J. Rousivalli.
30 Nov 64, 57p
Contract AT(49-11)-1889
Unclassified report

Descriptors: (*Irradiated foods, Fishes), (*Fishes, Nuclear industrial applications).

UCRL-12261 Field 18K
CFSTI Prices: HC$3.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
SINGLE-PULSE TIME-OPTIMAL SOLUTION OF THE REACTOR SHUTDOWN PROBLEM,
by Gerald L. Dittman. 16 Dec 64, 52p
Contract W-7405-ENG-48
Unclassified report

Descriptors: (*Reactor shutdown, Reactor control).

UCRL-12272 Field 18D
CFSTI Prices: HC$2.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
RADIOACTIVE EFFLUENT MONITORING AT THE NEVADA TEST SITE FOLLOWING NUCLEAR DETONATIONS,
by R. L. Getchy. 21 Dec 64, 28p
Contract W-7405-ENG-48
Unclassified report

Descriptors: (*Radiation monitors, Health physics), (*Radioactivity, Health physics instrumentation).

WAPD-MRP-111 Field 18I
CFSTI Prices: HC$2.50 MF$0.75

Bettis Atomic Power Lab., Pittsburgh, Pa.
PRESSURIZED WATER REACTOR (PWR) PROJECT.
Technical progress rept., 24 Oct 64-31 Jan 65.
1965, 97p
Contract AT(11-1)-GEN-14
Unclassified report

Descriptors: (*Pressurized water reactors, Reactor operation), (*Reactor theory, Nuclear engineering).

19. Ordnance

Patent 3,177,601 Field 19F

BOLT STOP FOR USE WITH TANDEM-TYPE MAGAZINES.
Patent assigned to Army,
by Robert Meunier. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Small arms, Feed mechanisms), (*Feed mechanisms, Small arms), Patents.

The firearm has a receiver and a barrel with a chamber. The receiver is provided with a magazine well for receiving a tandem type magazine. The magazine has front and rear compartments. A bolt stop is provided which is delayed one cycle after the last cartridge is removed from the magazine rear compartment before being effective so that the last round in the magazine is fired before the bolt is stopped.

Patent 3,177,772 Field 19F, 19A

RAPID FIRE GUN.
Patent assigned to Navy,
by Arthur J. Stanton and Philias H. Giroard. 13 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Antiaircraft guns, Shipborne), Rocket assisted projectiles, Firing mechanisms(Ammunition), Patents.

The rapid fire gun is adapted for shipboard antiaircraft use. It fires a cased rocket-assisted projectile of relatively large caliber. The system includes the gun, a large capacity magazine, a fan-shaped transfer mechanism. The ammunition is fed from the magazine, fanwise, through an arc of 90 degrees so as to sequentially align the longitudinal axes of the rounds paralled with that of the barrel of the gun.

Patent 3,180,263 Field 19A

STATIC ELECTRICITY DESENSITIZING DEVICE.
Patent assigned to Army,
by Nathan P. Williams, Jr. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Static dischargers, Explosives initiators), Static electricity, Detonators, Patents.

The device desensitizes electrically fired squibs, detonators, or initiators to stray currents of electricity, particularly those arising from the accumulation of static electrical charges. The device provides an arc gap so that accumulated static electricity is safely discharged across the gap to prevent unplanned firing.

Patent 3,180,860 Field 19A, 7A

WATER DRY PROCESS FOR NITROCELLULOSE.
Patent assigned to Army,
by Thomas W. Miller and Paul V. Blankenship.
27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Explosive materials, Processing), (*Nitrocellulose, Processing), Powders, Solvents, Separation, Patents.

Residual solvent is removed from powdered nitrocellulose by placing the powder in a tank of water at 65 degrees C., rapidly circulating a large quantity of water at a rate of 150 to 200 gallons per minute through the tank, and bubbling air at a rate of 50 to 75 cu. ft. per minute through the water until the powder becomes dark in color.

Patent 3,181,147 Field 19E

ALL-WEATHER PROJECTILE FIRE CONTROL SYSTEM-DIRECTOR MODE.
Patent assigned to Navy,
by Jack A. Crawford and John H. Gregory.
27 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Fire control systems, Projectiles), (*Aircraft fire control systems, Projectiles), Lead angle, Radar equipment, Antennas, Fighters, Ships, All-weather aviation, Patents.

The projectile fire control system may be carried by an aircraft or ship such as a fighter airplane. The fire control system includes a radar device with a rotating antenna. The all-weather fire control system includes circuitry which utilizes the information derived from the radar to compute proper lead angles so that the guns of the aircraft may be fired to cause projectile and target collision.

Patent 3,181,305 Field 19A, 7A, 7B

METHOD FOR ISOLATING NITROGEN TRIFLUORIDE FROM NITROUS OXIDE AND TETRAFLUOROHYDRAZINE.
Patent assigned to Air Force,
by Carl W. Schoenfelder. 4 May 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Propellants, Synthesis (Chemistry)), (*Fluorides, Nitrogen compounds), Separation, Oxides, Hydrazine derivatives, Fluorine compounds, Filters (Fluid), Low-temperature research, Patents.

Nitrogen trifluoride is useful as an intermediate in the synthesis of high energy liquid and solid propellants. Nitrous oxide is removed from the nitrogen trifluoride by a low temperature filtration and separation method.

UCRL-7438 Field 19A
CFSTI Prices: HC$1.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
CHEMICAL REACTIVITY TESTING OF EXPLOSIVES,
by J. W. Frazer and K. Ernst. 18 Jul 63, 20p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Explosive materials, Chemical reactions).

20. Physics

N65-16750 Field 20M, 20D
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
HEAT TRANSFER TO LAMINAR NON-NEWTONIAN FLOW IN A CIRCULAR TUBE WITH VARIABLE CIRCUMFERENTIAL WALL TEMPERATURE OR HEAT FLUX,
by Robert M. Inman. Feb 65, 22p
NASA-TN-D-2674
Unclassified report

Descriptors: (*Heat transfer, Laminar flow), (*Laminar flow, Heat transfer).

N65-17330 Field 20K
CFSTI Prices: HC$3.00 MF$0.50

Southwest Research Inst., San Antonio, Tex.
FREE VIBRATIONS OF CONICAL SHELLS,
by William C. L. Hu. Feb 65, 48p
Contract NASr94 06
NASA TN-D-2666
Unclassified report

Descriptors: (*Structural shells, Vibration), (*Conical bodies, Vibration).

N65-17453 Field 20K, 13M, 11B
CFSTI Prices: HC$1.00 MF$0.50

California Univ., Los Angeles.
LOAD-BEARING CHARACTERISTICS OF BIAXIALLY PRESTRESSED CERAMIC PLATES,
by M. A. Ali, R. D. Chipman, Peter Kurtz, and W. J. Knapp. Mar 65, 17p
Grant NsG427
NASA CR-188
Unclassified report

Descriptors: (*Ceramic materials, Loading(Mechanics)), Structural properties.

N65-18498 Field 20A, 20K
CFSTI Prices: HC$6.00 MF$1.25

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
SOUND AND STRUCTURAL VIBRATION,
by Preston W. Smith, Jr., and Richard H. Lyon.
Mar 65, 216p
Contract NASw788
NASA CR-160
Unclassified report

Descriptors: (*Vibration, Structures), (*Sound, Vibration).

N65-20983 Field 20F
CFSTI Prices: HC$3.00 MF$0.50

United Aircraft Corp., East Hartford, Conn.
EXPERIMENTAL INVESTIGATION OF THE OPACITY OF SMALL PARTICLES,
by P. J. Marteney. Apr 65, 49p
Contract NASw847
NASA CR-211
Unclassified report

Descriptors: (*Particles, Optical properties), (*Optical properties, Particles).

Patent 3,177,445 Field 20L, 9A

HARMONIC GENERATOR USING EQUALLY SPACED ENERGY LEVELS.
Patent assigned to Army,
by Charles M. Kellington. 6 Apr 65,
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Frequency multipliers, Pumping-(Electronics), (*Generators, Paramagnetic materials), Quantum mechanics, Frequency shift, Patents.

The generator for producing second harmonic frequencies includes a paramagnetic crystal. The solid state crystal has the ability to absorb and emit energy. The crystal is pumped at one frequency while the crystal is permitted to emit at a frequency which is the harmonic of the pump frequency.

Patent 3,180,575 Field 20D, 9B

FLUID TIME GATE.
Patent assigned to Army,
by Raymond W. Warren. 27 Apr 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Fluid flow, Control systems), (*Computer logic, Fluid flow), (*Amplifiers, Fluid flow), Relaxation oscillators, Patents.

The pure fluid time gate is capable of gating fluid input signals without the use of moving mechanical parts. The output passage of a pure fluid oscillator of the sonic or relaxation type is coupled to the power nozzle of an AND or OR-NOR pure fluid logic component so as to provide a pure fluid time gate component. No moving parts are required.

PB-167 584 Field 20K, 20D
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
THE RATIONAL MECHANICS OF MATERIALS PAST, PRESENT, FUTURE,
by C. Truesdell. Sep 58, 30p
Technical summary rept. no. MRC-TSR-41
Contract DA11 022ORD2059
AD 208 054

Unclassified report

Descriptors: (*Mechanics, Materials), Elasticity, Torque, Mathematics.

PB-167 667 Field 20M
CFSTI Prices: HC$4.00 MF$1.00

Stanford Univ., Calif. Nuclear Technology Lab.
LOCAL BOILING EFFECTS ON DENSITY AND PRESSURE DROP,
by Charles P. Costello. Jun 58, 119p
Technical rept. no. TR-3
Grant NSF G2775

Unclassified report

Descriptors: (*Boiling, Surface properties), (*Heat transfer, Boiling), (*Vapors, Thickness), Bubbles, Density, Pressure, Boundary layer, Boiling water reactors.

PB-167 671 Field 20K, 9B
CFSTI Prices: HC$2.00 MF$0.75

California Univ., Berkeley. Institute of Engineering Research.
A TRILINEAR VIBRATING SYSTEM AS SIMULATED BY AN ELECTRONIC ANALOG COMPUTER,
by Martin H. Dost and Cyril P. Atkinson. Sep 57, 43p
Series no. 106, Issue no. 2
Grant NSF G3302

Unclassified report

Descriptors: (*Vibration, Nonlinear systems), (*Simulation, Nonlinear systems), (*Analog computers, Simulation), Damping, Harmonic analysis, Nonlinear differential equations, Viscosity, Force(Mechanics), Resonance.

The free and forced oscillations of a vibratory system are studied with viscous damping and an odd piecewise linear (trilinear) restoring force, which when plotted vs displacement has a slope which is first decreased and then increased with respect to the initial slope. An analog computer was used to obtain steady state vibrations of the system. Frequency ranges were found where the fundamental harmonic component and several superharmonic components have their resonance.

PB-167 694 Field 20D
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
IMPULSIVE ROTATORY MOTION OF A CIRCULAR DISK IN A VISCOUS FLUID,
by Ram Prakash Kanwal. Mar 59, 11p
Technical summary rept. no. MRC-TSR-85
Contract DA11 0220RD2059
AD 218 611

Unclassified report

Descriptors: (*Disks, Rotation), (*Fluid dynamic properties, Disks), Viscosity, Hydrodynamics, Oscillation, Viscosimeters, Partial differential equations.

An exact analytic solution is given for the flow when an infinitesimally thin circular disk is given an impulsive moment in a viscous fluid.

PB-167 703 Field 20K, 12A
CFSTI Prices: HC$2.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
PLANE ELASTIC SYSTEMS, III. MATHEMATICAL PRELIMINARIES TO THE BOUNDARY VALUE PROBLEMS,
by L. M. Milne-Thomson. Feb 59, 33p
Technical summary rept. no. MRC-TSR-73
Contract DA11 022ORD2059
AD 213 463

Unclassified report

See also PB-149 756.

Descriptors: (*Boundary value problems, Elasticity), (*Elasticity, Boundary value problems), Partial differential equations, Integrals, Functions, Equations.

CONTENTS:
Convention regarding sense of description of a contour
The complex Stokes's theorem
Cauchy's integral formula
Cauchy's integral formula for the infinite region exterior to a closed contour
To find the function whose real part is given on the unit circle
Principal value of an integral
Cauchy integrals
Sectionally holomorphic functions
The formulae of Plemelj
A boundary value problem
The function x(z)
Solution of a homogeneous functional equation
Solution of an inhomogeneous equation
A mixed equation
Statement of four fundamental boundary value problems.

PB-167 705 Field 20K, 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
PARAMETRIC EXPANSIONS FOR A CLASS OF BOUNDARY VALUE PROBLEMS OF PARTIAL DIFFERENTIAL EQUATIONS,
by M. W. Johnson and E. Reissner. Feb 59, 16p
Technical summary rept. no. MRC-TSR-78
Contract DA11 022ORD2059
AD 213 465

Unclassified report

Descriptors: (*Boundary value problems, Partial differential equations), (*Partial differential equations, Boundary value problems), (*Structural shells, Elasticity), (*Cylindrical bodies, Deformation).

A description is given of an expansion procedure which was formulated in connection with the problem of unsymmetrical bending of elastic circular cylindrical shells. The type of problem considered involves two independent variables and the domain in which a solution is wanted consists of a semi-infinite strip of well-defined width. It is known that for many problems of this kind one encounters boundary layer phenomena with characteristic lengths in the direction of the infinite sides of the strip, which are small compared to the width of the strip. The effective step in the present procedure consists in recognition of the fact that in addition to having to deal with such a boundary layer, one may simultaneously have to deal with a wide layer, the characteristic length of which is large compared with the width of the strip.

PB-167 708 Field 20I, 20N, 1A
CFSTI Prices: HC$6.00 MF$1.25

University of Southern California, Los Angeles. Dept. of Electrical Engineering.
WIND TUNNEL INVESTIGATION OF THE INTERACTION OF RADIO WAVES WITH SHOCK-IONIZED FLOW FIELDS,
Final rept.,
by Z. A. Kaprielian. Dec 64, 202p
Rept. no. USCEC-82-219
Contract AF19 604 6195, Proj. 4642, Task 464202
AFCRL 65-7; AD 457 512
Unclassified report

Descriptors: (*Plasma medium, Electromagnetic waves), (*Electromagnetic waves, Propagation), Shock waves, Ionization, Fluid flow, Wind tunnels, Communication theory, Nose cones, Scattering, Models(Simulations), Microwaves, Atmosphere entry, Antennas, Plasma sheath, Radio waves.

The experimental part of the program may be divided into two major categories: (1) Wind tunnel investigation of the interaction of radio waves with shockionized flow fields; (2) Steady state hot plasma facilities for investigation of wave propagation in plasmas. The theoretical part of the program can also be divided into two major categories: (1) Investigation of the interaction of electromagnetic waves with plasmas: Attempts have been made to devise idealized prototype problems which can be subjected to rigorous analysis yet at the same time may yield information useful for such practical applications as radio communication with, or radar detection of, plasma sheathed space vehicles, propagation of electromagnetic waves in ionosphere, plasma diagnostics, etc. (2) Study of classical electromagnetic waves problems. It is noted that much more attention has been devoted in the past to the diffraction of electromagnetic waves by or radiation from perfectly conducting objects.

PB-167 713 Field 20K, 12A
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
LARGE DEFLECTIONS OF CIRCULAR PLATES SUPPORTED ALONG THEIR BOUNDARY AND ALONG CONCENTRIC CIRCUMFERENCES INSIDE,
by J. Nowinski. Jan 59, 19p
Technical summary rept. no. MRC-TSR-67
Contract DA11 022ORD2059
AD 211 066
Unclassified report

Descriptors: (*Flat plate models, Deflection), Elasticity, Loading(Mechanics), Partial differential equations, Boundary value problems.

Thin, elastic and isotropic, circular plates with large deflections supported along their boundary as well as along concentric circumferences inside are considered using Berger's field equations. Solution of the general problem, involving any number of inner supports, is given. A case of a clamped plate with a pointwise support at the center acted upon by a uniform load is treated in more detail. A solution of a related problem concerning a clamped plate loaded at the center by a concentrated force is obtained and compared with an equivalent solution derived using Galerkin's method. (Author)

PB-167 723 Field 20K
CFSTI Prices: HC$1.00 MF$0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
NOTE ON AN ANALYSIS OF LARGE DEFLECTIONS OF RECTANGULAR PLATES,
by J. Nowinski. Aug 58, 19p
Technical summary rept. MRC-TSR-34
Contract DA11 022ORD2059 Unclassified report
AD 203 819

Descriptors: (*Metal plates, Deflection), Rectangular bodies, Loading(Mechanics), Differential equations, Deformation, Analysis.

Using simplified equations of the nonlinear theory of plates derived by H. M. Berger, several complex problems concerning the determining of the deflection of plates, with accuracy to a normalized constant, have been solved. They concern the infinite plate strip, the half-infinite plate strip and the finite rectangular plate. (Author)

PB-167 782 Field 20M, 1A
CFSTI Prices: HC$2.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
HIGH TEMPERATURE TURBULENT HEAT-TRANSFER MEASUREMENTS,
by Barry J. Noonan and James L. Rand. 20 Jan 64, 31p NOLTR-63-276 Unclassified report
AD 445 121

Presented at the United States Navy Symposium on Aeroballistics (6th), BOWACA, 31 Oct-1 Nov 63.

Descriptors: (*Aerodynamic heating, Turbulent boundary layer), (*Heat transfer, Turbulent boundary layer), (*Turbulent boundary layer, Heat transfer), High-temperature research, Calorimeters, Stagnation point, Turbulence, Measurement, Equations, Mathematical predictions.

Turbulent heat-transfer rates through a highly cooled boundary layer have been investigated experimentally by testing in the throat region of a reflected shock tunnel. Local heat-transfer measurements were made in a constant diameter pipe, simulating a flat plate, with extreme free-stream conditions. Unit Reynolds number, on the order of 3 x 10 7/ft, stagnation enthalpies approaching 8,000 Btu/lb, free-stream temperatures up to 8,000K, and free-stream pressures of about 100 atmospheres were generated by the shock tunnel for these experiments. Heat-transfer rates in the neighborhood of 50,000 Btu/sq ft sec were measured by means of a ring-type calorimeter heat-transfer gage developed at the Naval Ordnance Laboratory. Experimental results are compared with some existing empirical methods for predicting convective heat-transfer coefficients. It is concluded that the experimental data substantiate some of the empirical predictions for the given test conditions. (Author)

UCRL-11622 Field 20H
CFSTI Prices: HC$1.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Berkeley.
SIMPLE CALCULATIONS OF RESONANCES IN BARYON-MESON TWO-PARTICLE CHANNELS,
by Shu-yuan Chu. 19 Aug 64, 12p
N64-33430
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Baryons, Nuclear resonance), (*Mesons, Nuclear resonance).

UCRL-12325 Field 20I
CFSTI Prices: HC$2.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
MECHANICAL DESIGN FOR PLASMA PHYSICS RESEARCH,
by W. S. Neef, Jr. 14 Jan 65, 33p
Contract W-7405-ENG-48
Unclassified report

Descriptors: (*Plasma physics, Laboratory equipment).

21. Propulsion and Fuels

N65-16890 Field 21C
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AN EXPERIMENTAL INVESTIGATION OF PEAK AND AVERAGE HEATING EFFECTS IN CASCADE-ARC JETS,
by W. D. Beasley, R. L. Barger, and J. D. Brooks.
Feb 65, 20p NASA-TN-D-2653 Unclassified report

Descriptors: (*Arc-jet engines, Heating), (*Electric propulsion, Rocket propulsion).

N65-20876 Field 21F, 21H
CFSTI Prices: HC$3.00 MF$0.75

United Aircraft Corp., East Hartford, Conn.
ANALYTICAL STUDY OF MODERATOR WALL COOLING OF GASEOUS NUCLEAR ROCKET ENGINES,
by G. H. McLafferty. Apr 65, 74p
Contract NASw847
NASA CR-214
Unclassified report

Descriptors: (*Rocket motors, Cooling), (*Nuclear reactors, Rocket motors), Reactor moderators.

N65-20984 Field 21H, 21F, 20M
CFSTI Prices: HC$1.00 MF$0.50

United Aircraft Corp., East Hartford, Conn.
THERMODYNAMIC PROPERTIES OF COOLANT FLUIDS AND PARTICLE SEEDS FOR GASEOUS NUCLEAR ROCKETS,
by R. Roback. Apr 65, 22p
Contract NASw847 Unclassified report
NASA CR-212
Descriptors: (*Rocket motors, Cooling), (*Nuclear reactors, Rocket motors), (*Coolants, Thermodynamics).

Patent 3,179,702 Field 21I, 7B, 7C

REACTION OF CARBON DIOXIDE WITH FLUORINE.
Patent assigned to Navy,
by Roger S. Porter and George H. Cady. 20 Apr 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Rocket propellants, Oxidizers), (*Peroxides, Organic compounds), Carbon dioxide, Fluorine, Chemical reactions, Patents.

Perfluorodimethyl peroxide is an oxidizing agent useful for fuels in rocket engines. It is prepared by contacting carbon dioxide with fluoride at about 325 degrees C.

PB-167 428 Field 21I, 21F
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A PARAMETRIC STUDY OF CERTAIN LOW-MOLECULAR-WEIGHTCOMPOUNDS AS NUCLEAR ROCKET PROPELLANTS. II. AMMONIA,
by F. J. Krieger. 31 Jul 59, 47p
Rept. no. RM-2401
AD 246 433 Unclassified report
Rept. on Proj. RAND. Available copy will not permit fully legible reproduction. See also PB-167 431.

Descriptors: (*Ammonia, Rocket propellants), (*Gaseous rocket propellants, Ammonia), (*Nuclear propulsion, Ammonia), Hydrogen, Molecular weight, Enthalpy, Entropy, Temperature, Pressure, Specific impulse, Rocket motor nozzles, Thermodynamics.

The purpose is the parametric investigation of low-molecular-weight, high-hydrogen-content compounds as propellants for nuclear-powered rockets. A two-part computational program was carried out for each compound; the results are presented in both tabular and graphic form. The results of the first part of the program are represented in static form, i.e., by the conventional Mollier diagram, in which specific enthalpy is plotted against specific entropy, with cross plots of temperature, pressure, and molecular weight. The results of the second part are represented in dynamic form by a series of diagrams in which specific impulse is plotted against pressure, with cross plots of chamber temperature, exhaust temperature, and rocket-nozzle area. It was assumed that the propellant gas, starting with a nonzero chamber velocity, maintained instantaneous chemical equilibrium composition as it expanded isentropically through a de Laval nozzle.

PB-167 431 Field 21I, 21F
CFSTI Prices: HC$2.00 MF$0.50

RAND Corp., Santa Monica, Calif.
A PARAMETRIC STUDY OF CERTAIN LOW-MOLECULAR-WEIGHT COMPOUNDS AS NUCLEAR ROCKET PROPELLANTS. III. WATER,
by F. J. Krieger. 31 Jul 59, 40p
Rept. no. RM-2402
AD 231 762 Unclassified report
Rept. on Proj. RAND. Available copy will not permit fully legible reproduction. See also PB-167 428.

Descriptors: (*Water, Rocket propellants), (*Gaseous rocket propellants, Water), (*Nuclear propulsion, Water), Hydrogen, Molecular weight, Enthalpy, Entropy, Temperature, Pressure, Specific impulse, Rocket motor nozzles, Thermodynamics.

PB-167 628 Field 21D
CFSTI Prices: HC$4.00 MF$1.00

George Washington Univ., Washington, D. C. School of Engineering and Applied Science.
THE POSSIBILITIES OF SOLVENT REFINED COAL.
Master's thesis,
by Robert M. Jimeson. 22 Feb 65, 142p
Unclassified report

Descriptors: (*Coal, Solvent extraction), Sulfur, Costs, Air pollution, Fuels, Fuel oil, Blast furnaces, Iron industry, Pyrites, Electric power production, Transportation, Processing, Feasibility studies.

The broader utilization of coal is often hampered by coal's physical properties and its high ash and sulfer content. Coal's physical properties can be favorably altered and its ash and sulfur content greatly reduced by solvent refining. The thesis describes a process for solvent refining of coal and applies a production cost formula to estimate the selling price of refined coal in various sections of the world. Utilizing these prices as a base the potential size of the competitive market available to solvent refined coal is estimated up to the year 1980. Sizeable economically competitive markets became apparent in the combustion, metallurgical, and diesel propulsion fields. These markets are estimated at a total of 103 million tons by 1970 and 217 million tons by 1980. Certain technological unknowns obscured the assurance of the various important markets; thus, other than show the prominent market possibilities, the study reveals a clear order of additional research needed to determine the reality of the estimates. (Author)

PB-167 737 Field 21I
CFSTI Prices: HC$1.00 MF$0.50

Naval Ordnance Lab., White Oak, Md.
REVIEW OF NOL SENSITIVITY WORK APPLICABLE TO LARGE SOLID MOTOR EXPLOSION HAZARDS,
by Donna Price. 18 Aug 64, 18p NOLTR-64-148
AD 448349
Unclassified report

Presented at the Conference on Large Solid Motor Explosion Hazards sponsored by the U. S. Air Force (AFSSD) and Aerospace Corporation, 15 Apr 64.

Descriptors: (*Solid rocket propellants, Sensitivity), (*Rocket motors(Solid propellant), Hazards), Detonations, Tests, Calibration, Pressure, Time, Data, Impact shock, Safety, Explosive materials.

The purpose of this report is to summarize NOL sensitivity work which is particularly relevant to the hazards encountered in large propellant motors. Many of the results have been presented in detail in prior NOLTR's; appendices contain previously unreported data on pressure loading by the detonation products of tetryl and references to reports, now in preparation, for the most recent work. (Author)

PB-167 809 Field 21D
CFSTI Prices: HC$7.15 MF$2.25

Spencer Chemical Div., Gulf Oil Corp., Merriam, Kans.
SOLVENT PROCESSING OF COAL TO PRODUCE A DE-ASHED PRODUCT.
Research and development rept. no. 9, 22 Aug 62-22 Feb 65,
by Dean L. Kloepper, Thomas F. Rogers, Charles H. Wright, and Willard C. Bull. 22 Feb 65, 412p
Contract 14 01 0001 275 Unclassified report

Descriptors: (*Coal, Separation), Solvents, Solutions, Liquid filters, Impurities, Minerals, Processing, Economics, Centrefuge separation.

It has been shown that the ash can successfully be removed from coal using a process in which: The coal is dissolved in the presence of hydrogen and using a solvent derived from the coal itself; The coal solution is filtered to remove the undissolved mineral matter; The solvent is removed for recycle and the de-ashed product recovered. The dissolver area represents the heart of the process and while many variables need additional study, it has been shown on a gross basis that using approximately the same reaction conditions will result in essentially complete solution of a variety of coals. Hydrogen requirements are low and do not represent an economic problem. It has been demonstrated that solvent is generated in the process and that recycled solvent retains its ability to dissolve coal. The use of solvent generated from the feed coal is a unique feature of the process. Solvent recovery and product solidification should not be problems in a commercial unit. A continuous unit was designed and built and technical feasibility of the process proven by simultaneous operation of all parts of the system. Since only small quantities of material could be made in this unit it was not possible to do more than very limited testing of the de-ashed product for the potential commercial applications in which it might be considered desirable. Market research has shown a potential market for the de-ashed product of over 72,000,000 tons annually.

PB-167 819 Field 21C, 14B, 1A, 20I
CFSTI Prices: HC$3.00 MF$0.75

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
DEVELOPMENT OF A STEADY-FLOW JxB ACCELERATOR FOR WIND TUNNEL APPLICATION,
by K. E. Tempelmeyer, A. K. Windmueller, and L. E. Rittenhouse. Dec 64, 57p AEDC TDR-64-261
Contract AF40 600 1000, Proj. PL2287, Task 777805
AD 452 942

Presented at the AGARD Specialists' Meeting on 'Arc Heaters and MHD Accelerators for Aerodynamic Purposes', 21-23 September 1964, Rhode-Saint-Genese, Belgium.

Descriptors: (*Supersonic wind tunnels, Magnetohydrodynamics), (*Ion accelerators, Plasma medium), Instrumentation, Acceleration, Plasma jets, Electric discharges, Plasma medium, High-temperature research, Nitrogen, Beryllium compounds, Oxides, Electrodes, Cooling, Water, Ionization, One-dimensional flow, Magnetic fields.

A description is given of the various aspects of an experimental program which is currently in progress at the Arnold Engineering Development Center to develop a steady-flow, direct-current, JxB accelerator for a wind tunnel driver. Electrical discharge and material tests have been made in a supersonic seeded nitrogen plasma at static temperatures and pressures near 3000K and 1 atm, respectively. Cooled copper electrodes set flush in a wall could be made to carry sufficient electrical currents to make MHD acceleration feasible and still have negligible erosion. Sprayed beryllium oxide was found to be the best insulation material of those tested for the conditions at which a high-pressure accelerator must operate. The design of a water-cooled accelerator having 117 pairs of segmented electrodes and the initial success of prooftests with a prototype twenty-pair electrode accelerator are described. Electrode current fluctuations and various problems associated with seeding the plasma are pointed out as important problem areas for future work.

22. Space Technology

AD-442 757 Field 22A, 1A, 12A
CFSTI Price: HC$6.00

Ballistic Research Labs., Aberdeen Proving Ground, Md.
FREE FLIGHT MOTION OF SYMMETRIC MISSILES,
by Charles H. Murphy. Jul 63, 234p BRL-1216
Proj. 1M010501A005

Unclassified report

Descriptors: (*Free flight trajectories, Guided missiles), Stability, Linear systems, Nonlinear systems, Drag, Pitch(Motion), Yaw, Roll, Aerodynamic characteristics, Measurement, Equations, Mathematical analysis, Theory, Motion.

The linearized angular motion of a symmetric missile is developed with consideration for the rolling motion, drag, aerodynamic jump and the effect of varying coefficients. The tricyclic motion of a missile with misaligned control surfaces is briefly considered. This linear theory is then applied to the analysis of ballistic range data. Simple cubic nonlinearities in static moment and Magnus moment are treated by a quasi-linear analysis and these cubic coefficients obtained from ballistic range flight data. More generalized relations for arbitrary symmetric nonlinear terms are derived, and their use in the construction of 'amplitude' planes is indicated. These amplitude planes have proven to be useful for the prediction of missile flight performance. The influence of strongly nonlinear static moments is determined by a perturbation method which makes use of two quasi-constants of the motion -- total energy and angular momentum. (Author)

N65-16576 Field 22D
CFSTI Prices: HC$3.00 MF$0.75

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DETERMINATION OF LOADS ON A FLEXIBLE LAUNCH VEHICLE DURING ASCENT THROUGH WINDS,
by Harold C. Lester and Dennis F. Collins. Feb 65, 63p NASA TN D-2590

Unclassified report

Descriptors: (*Launch vehicles(Aerospace), Loading-(Mechanics)), (*Pitch(Motion), Launch vehicles(Aerospace)), (*Moments, Launch vehicles(Aerospace)), (*Ascent trajectories, Winds).

N65-17117 Field 22B
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
PRELIMINARY INVESTIGATION OF THE HANDLING QUALITIES OF A VEHICLE IN A SIMULATED LUNAR GRAVITATIONAL FIELD,
by Peter C. Boisseau, Robert O. Schade, Robert A. Champine, and Henry C. Elkins. Feb 65, 25p
NASA-TN-D-2636

Unclassified report

Descriptors: (*Lunar craft, Handling).

N65-17121 Field 22D
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
DETECTION OF FLOW-FIELD INSTABILITY IN THE PRESENCE OF BUFFETING BY THE PARTIAL-MODE MODEL TECHNIQUE,
by Henry A. Cole, Jr., Robert C. Robinson, and Bruno J. Gambucci. Feb 65, 33p NASA-TN-D-2689

Unclassified report

Descriptors: (*Boosters, Buffeting), (*Buffeting, Stability).

N65-17333 Field 22B
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
AN ANALYTICAL COMPARISON OF SOME ELECTRO-MAGNETIC SYSTEMS FOR REMOVING MOMENTUM STORED BY A SATELLITE ATTITUDE CONTROL SYSTEM,
by Stuart C. Brown. Mar 65, 41p
NASA-TN-D-2693

Unclassified report

Descriptors: (*Momentun, Attitude control systems), (*Attitude control systems, Momentum).

N65-17462 Field 22C
CFSTI Prices: HC$3.00 MF$0.75

National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
SOME EFFICIENT COMPUTATION TECHNIQUES INCLUDING THEIR APPLICATION TO TIME OPTIMAL TRAJECTORIES FROM PARKING ORBIT,
by William B. Tucker. Mar 65, 52p
NASA-TN-D-2691

Unclassified report

Descriptors: (*Space flight, Optimization), (*Parking orbit trajectories, Space flight).

N65-17536 Field 22B, 22C
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DYNAMIC MODEL INVESTIGATION OF THE LANDING CHARACTERISTICS OF A MANNED SPACECRAFT,
by William C. Thompson. Mar 65, 34p
NASA TN D-2497

Unclassified report

Descriptors: (*Spacecraft, Landing impact), (*Landing impact, Models(Simulations)), Water, Parachutes.

N65-18213 Field 22C
CFSTI Prices: HC$3.00 MF$0.50

National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A FIXED-BASE SIMULATOR STUDY OF PILOTED ENTRY INTO THE EARTH'S ATMOSPHERE AT PARABOLIC VELOCITY,
by Martin T. Moul and Albert A. Schy. Mar 65, 52p
NASA TN D-2707

Unclassified report

Descriptors: (*Atmosphere entry, Simulation).

N65-20881 Field 22A
CFSTI Prices: HC$1.00 MF$0.50

National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
DYNAMICS OF A ROTATING CYLINDRICAL SPACE STATION,
by Walter Krause Polstorff. Apr 65, 15p
NASA-TN-D-2749

Unclassified report

Descriptors: (*Space stations, Cylindrical bodies).

Patent 3,181,821 Field 22B

SPACE CRAFT SOFT LANDING SYSTEM.
Patent assigned to NASA,
by Timothy O. Eddins. 4 May 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Landing gear, Spacecraft), (*Soft landings, Landing gear), Extendable structures, Vibration isolators, Lunar craft, Patents.

The landing gear system is for a spacecraft adapted to perform soft landings on lunar or terrestrial surfaces. The landing gear structure includes a plurality of legs suitable for truss type construction connected to a shroud extending circumferentially around the base of the spacecraft. The legs are pivotally connected to the shroud so that during flight they are retracted and are extendable preparatory to performing a landing on the lunar surface. The shroud is connected to the base of the spacecraft by energy absorbing elements.

PB-167 658 Field 22B, 8B
CFSTI Prices: HC$2.00 MF$0.50

Coast and Geodetic Survey, Washington, D. C.
ACCURACY ASPECTS OF A WORLD-WIDE PASSIVE SATELLITE TRIANGULATION SYSTEM,
by Hellmut H. Schmid. 1964, 35p

Unclassified report

Rept. presented at the Meeting of the American Society of Photogrammetry, Washington, D. C., 20 Mar 64.

Descriptors: (*Communication satellites(Passive), Geodesics), (*Photogrammetry, Communication satellites(Passive)), Mapping, Tracking, Errors.

SUBJECT INDEX

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PB-167 665	08	PB-167 665
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PB-167 668	13	PB-167 668
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PB-167 670	13	PB-167 670
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PB-167 677	09	PB-167 677
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PB-167 682	12	PB-167 682
PB-167 690	12	PB-167 690
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PB-167 692	12	PB-167 692
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